



EFJohnson®

Catalog





Corporate Profile

EFJohnson is a leading provider of two way radios and communication systems for law enforcement, fire fighters, EMS and the military. Founded in 1923, EFJohnson is one of the first companies to be fully compliant with federal government Project 25 interoperability standards. EFJohnson offers a comprehensive portfolio of digital and analog radio communications solutions to effectively and affordably assist in the transition to digital P25 compliant systems.

Product Overview

EFJohnson's product portfolio includes conventional and trunked radio systems, land mobile radio base station/repeaters, along with mobile and portable radios.

Trunked and Conventional Radio Systems

EFJohnson's IP25™ Infrastructure Systems provide a secure, flexible Voice over Internet Protocol (VoIP) solution for building out trunked or conventional Project 25 networks.

Portable and Mobile Radios

EFJohnson radios are used throughout the world by military, police, fire, paramedics, and homeland security professionals. These radios meet narrowband requirements for analog and digital Project 25 formats, and support legacy systems while providing a seamless transition to narrowband operation.

Company Facts

EFJohnson, a wholly owned subsidiary of EFJ, Inc.

Date Founded: October 1923

Annual Revenues: \$65 million FY2006

Corporate Headquarters: Irving, TX

Operations/Manufacturing: Irving, TX

Website: www.EFJohnson.com

Stock Symbol: EFJI (NASDAQ)

Management Team

Michael E. Jalbert, Chairman & Chief Executive Officer

Ellen O'Hara, President & Chief Operations Officer

Chuck Steier, Chief Financial Officer

Brenda Jackson, Senior Vice President, Sales & Marketing

Ed Kelly, Vice President, Product & Business Development

Phil Walker, Vice President, Quality

John Szpak, Vice President, Development Engineering

Marshall Lamm, Vice President, Operations

John Oblak, Vice President, Standards/Regulatory Affairs

Ron Thompson, Vice President, Customer Service



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800-201-9755

Waseca, MN
123 North State Street
Waseca, MN 56093
507-837-5100

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3900 NW 12th Street, Suite 200
Lincoln, NE 68521
402-474-4800

Portables



5100^{Series} Portable Radio

700/800 VHF UHF

EFJohnson's 5100 Series Portable Radio is rugged, lightweight, versatile, and designed to operate in analog and digital applications. It provides a seamless evolution to next generation networks while offering investment protection for your present communications system; all in a powerful software-controlled device that is easy on your mind and your budget. If you need a multi-protocol portable radio that leads the industry in feature richness and system interoperability, then the 5100 Series Portable Radio is your clear product choice.



Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), Project 25 Trunked and Conventional system protocols, and Project 25 Over-The-Air Rekeying (OTAR) functionality.

Industry's Only SMARTNET[®] II / SmartZone[®] Licensee

Industry's only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.

Numerous Encryption Protocols

Supports industry standard encryption capabilities such as AES, DES-OFB, and DES. Ask about our free Single Key DES-OFB encryption for P25.



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

Multiple Configuration Offerings

Includes a Model I (no display or keypad), Model II (display, basic keypad) and a Model III (display, DTMF keypad) version that features an enhanced backlit display and backlit keypad for easier viewing and usage.

Significant Product Flexibility

Enables programming of up to 512 channel/talkgroups, supports both narrowband (12.5 kHz) and wideband (25 kHz) channel spacing, and multiple system protocols.

Simplified Feature Modifications and Updates

Easy radio programming and feature updating using EFJohnson's PC Configure[™] application.

Extensive Accessory Suite

Complete line of accessory products including speaker microphones, headsets, surveillance kits, batteries, chargers, carrying apparatus, and encryption "keyloading" devices.

Enhanced Product Robustness

Meets applicable Mil Standard 810C, D, E, and F specifications, as well as approved by Factory Mutual as intrinsically safe for use in hazardous environments.

Submersibility

Immersible to a depth of 1 meter for 30 minutes (option - Model I only)

5100^{Series} Portable Radio

Typical Performance Specifications

GENERAL	700/800	VHF	UHF R1	UHF R2
Frequency Range	762–806 MHz 806–870 MHz	136–174 MHz	380–470 MHz	450–512 MHz
Channel Spacing	12.5 kHz, 25 kHz	12.5 kHz, 25 kHz	12.5 kHz, 25 kHz	12.5 kHz, 25 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
FCC Type Acceptance Certification	ATH2425171	ATH2425111	ATH2425131	ATH2425141
Industry Canada Type Certification	IC: 933B-2425171	IC: 933B-2425111	IC: 933B2425131	IC: 933B-2425141
FCC Emissions Designators	11K0F3E, 16K0F3E, 14K0F3E, 8K10F1E, 8K10F1D	16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D	16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D	16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D
Input Voltage	7.2 V			
Dimensions (w/o antenna) (HxWxD)	6.65" x 2.55" x 1.80"			
Weight (with standard battery)	24 oz. (675 g)			
Case	Polycarbonate—black, yellow, orange			
Temperature Range	–30°C to +60°C			

TRANSMITTER

RF Power Output	2.5/1 W (700 MHz), 3/1 W (800 MHz)	5/1 W	4/1 W	4/1 W
Frequency Stability (–30°C to +60°C)	±1.5 ppm	±1.5 ppm	±1.5 ppm	±1.5 ppm
Modulation Limiting				
25 kHz channels	±5 kHz	±5 kHz	±5 kHz	±5 kHz
12.5 kHz channels	±2.5 kHz	±2.5 kHz	±2.5 kHz	±2.5 kHz
Emissions (Conducted/Radiated)	–75 dBc	–75 dBc	–75 dBc	–75 dBc
Audio Response	+1, -3dB	+1, -3dB	+1, -3dB	+1, -3dB
FM Hum and Noise				
25 kHz channels	-40 dB	-45 dB	-45 dB	-45 dB
12.5 kHz channels	-35 dB	-40 dB	-40 dB	-40 dB
Audio Distortion	2%	2%	2%	2%

RECEIVER

Audio Output Power	500 mW	500 mW	500 mW	500 mW
Frequency Stability (–30°C to +60°C)	±1.5 ppm	±1.5 ppm	±1.5 ppm	±1.5 ppm
Sensitivity				
Analog Mode: 12 dB SINAD	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)
Digital Mode: 5% BER	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)
Selectivity				
25 kHz channels	-75 dB	-75 dB	-75 dB	-75 dB
12.5 kHz channels	-63 dB	-63 dB	-63 dB	-63 dB
Intermodulation	–75 dB	–75 dB	–75 dB	–75 dB
Spurious & Image Rejection	–75 dB	–75 dB	–75 dB	–75 dB
FM Hum and Noise				
25 kHz channels	-40 dB	-40 dB	-40 dB	-40 dB
12.5 kHz channels	-35 dB	-35 dB	-35 dB	-35 dB
Audio Distortion	2%	2%	2%	2%

All specifications are measured per TIA 102.CAAA, TIA 102.CAAB and per TIA 603 standards.

BATTERIES

Battery Type	Dimensions (HxWxD)	Weight	Approx. Life (5/5/90)
Extra-High Capacity NiMH	6.0" x 2.3" x 0.85"	0.81 lbs	UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours
Extra-High Capacity NiMH, IS	6.0" x 2.3" x 0.85"	0.81 lbs	UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours
Alkaline Battery Clamshell	7.2" x 2.6" x 2.0"	0.98 lbs (w/12 AA batt.)	14-16 hours

* Option Model I only

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ENVIRONMENTAL SPECIFICATIONS

Environment	Mil Spec 810C		Mil Spec 810D		Mil Spec 810E		Mil Spec 810F	
	M	P	M	P	M	P	M	P
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II
High Temp.	501.1	I	501.2	I, II	501.3	I, II	501.4	I, II
Low Temp.	502.1	I	502.2	I, II	502.3	I, II	502.4	I, II
Temp. Shock	503.1	I	503.2	I	503.3	I	503.4	I
Solar Radiation	505.1	I	505.2	I	505.3	I	505.4	I
Rain/Blown Rain	506.1	I, II	506.2	II	506.3	I, II	506.4	I, II
Humidity	507.1	II	507.2	II, III	507.3	II, III		
Salt Fog	509.1	I	509.2	I	509.3	I		
Dust and Sand	510.1	I	510.2	I	510.3	I	510.4	I
Immersion*	512.1	I	512.2	I	512.3	I	512.4	I
Vibration	514.2	VII, VIII	514.3	I(8)	514.4	I(8)	514.5	I(24)
Shock	516.2	I, II, V	516.3	I, IV, VI	516.4	I, IV, VI	516.5	I, IV, VI

M=Method P=Procedure

ENCRYPTION OPTIONS

Supported Encryption Algorithms	DES, DES-OFB, AES
Encryption Keys/Radio	16 Common Key Reference (CKR) 16 Physical Identifier (PID) Compatible with Motorola Key Variable Loader
Encryption Frame Re-sync Interval	P25 CAI 360 msec
Encryption Keying	External Key Loader, OTAR
Synchronization	CFB – Cipher Feedback OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Erasure	Keyboard Command
Code Key Initialization	Internal pseudorandom generator
Standards	FIPS 46-3, FIPS 81, FIPS 140-2, FIPS 197

FACTORY MUTUAL APPROVALS

Intrinsically Safe

Class I	Division 1 An area where there is or could be an explosive atmosphere most of the time in normal conditions.	C Ethylene D Propane and Methane E Conductive metal F Carbonaceous material coal, coke dust G Grain dust and flour
Class II		
Class III	Division 1 Location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.	Ignitable fibers or flyings

Non-Incendive

Class I	Division 2 An area where an explosive atmosphere exists only as a result of a fault.	A Acetylene B Hydrogen C Ethylene D Propane and Methane
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51SL^{Series} Portable Radio

700/800 VHF UHF

EFJohnson's 51SL Series Portable Radio is rugged, lightweight, versatile, and designed to operate in analog and digital applications. It provides a seamless evolution to next generation networks while offering investment protection for your present communications system; all in a powerful software-controlled device that is easy on your mind and your budget. If you need a multi-protocol portable radio that leads the industry in feature richness and system interoperability, then the 51SL Series Portable Radio is your clear product choice.



Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), Project 25 Trunked and Conventional system protocols, and Project 25 Over-The-Air Rekeying (OTAR) functionality.

Industry's Only SMARTNET[®] II / SmartZone[®] Licensee

Industry's only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.

Numerous Encryption Protocols

Supports industry standard software encryption capabilities such as DES-OFB, and DES. Ask about our free Single Key DES-OFB encryption for P25.



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

Multiple Configuration Offerings

Includes a Model II (display, basic keypad) and a Model III (display, DTMF keypad) version that features an enhanced backlit display and backlit keypad for easier viewing and usage.

Significant Product Flexibility

Enables programming of up to 512 channel/talkgroups, supports both narrowband (12.5 kHz) and wideband (25 kHz) channel spacing, and multiple system protocols.

Simplified Feature Modifications and Updates

Easy radio programming and feature updating using EFJohnson's PC Configure[™] application.

Extensive Accessory Suite

Complete line of accessory products including speaker microphones, headsets, surveillance kits, batteries, chargers, carrying apparatus, and encryption "keyloading" devices.

Enhanced Product Robustness

Meets applicable Mil Standard 810C, D, E, and F specifications, as well as approved by Factory Mutual as intrinsically safe for use in hazardous environments.

51SL^{Series} Portable Radio

Typical Performance Specifications

GENERAL	700/800	VHF	UHF R1	UHF R2
Frequency Range	762–806 MHz 806–870 MHz	136–174 MHz	380–470 MHz	450–512 MHz
Channel Spacing	12.5 kHz, 25 kHz	12.5 kHz, 25 kHz	12.5 kHz, 25 kHz	12.5 kHz, 25 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
FCC Type Acceptance Certification	ATH2425171	ATH2425111	ATH2425131	ATH2425141
Industry Canada Type Certification	IC: 933B-2425171	IC: 933B-2425111	IC: 933B2425131	IC: 933B-2425141
FCC Emissions Designators	11K0F3E, 16K0F3E, 14K0F3E, 8K10F1E, 8K10F1D	16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D	16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D	16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D
Input Voltage	7.2 V			
Dimensions (w/o antenna) (HxWxD)	6.7" x 2.52" x 1.9" (6.4 cm x 17.0 cm x 4.8 cm)			
Weight (with standard battery)	24 oz. (675 g)			
Case	Polycarbonate–black			
Temperature Range	–30°C to +60°C			

TRANSMITTER				
RF Power Output	2.5/1 W (700 MHz), 3/1 W (800 MHz)	5/1 W	4/1 W	4/1 W
Frequency Stability (–30°C to +60°C)	±1.5 ppm	±1.5 ppm	±1.5 ppm	±1.5 ppm
Modulation Limiting				
25 kHz channels	±5 kHz	±5 kHz	±5 kHz	±5 kHz
12.5 kHz channels	±2.5 kHz	±2.5 kHz	±2.5 kHz	±2.5 kHz
Emissions (Conducted/Radiated)	–75 dBc	–75 dBc	–75 dBc	–75 dBc
Audio Response	+1, –3dB	+1, –3dB	+1, –3dB	+1, –3dB
FM Hum and Noise				
25 kHz channels	–40 dB	–45 dB	–45 dB	–45 dB
12.5 kHz channels	–35 dB	–40 dB	–40 dB	–40 dB
Audio Distortion	2%	2%	2%	2%

RECEIVER				
Audio Output Power	500 mW	500 mW	500 mW	500 mW
Frequency Stability (–30°C to +60°C)	±1.5 ppm	±1.5 ppm	±1.5 ppm	±1.5 ppm
Sensitivity				
Analog Mode: 12 dB SINAD	0.25 uV (–119 dBm)	0.25 uV (–119 dBm)	0.25 uV (–119 dBm)	0.25 uV (–119 dBm)
Digital Mode: 5% BER	0.25 uV (–119 dBm)	0.25 uV (–119 dBm)	0.25 uV (–119 dBm)	0.25 uV (–119 dBm)
Selectivity				
25 kHz channels	–75 dB	–75 dB	–75 dB	–75 dB
12.5 kHz channels	–63 dB	–63 dB	–63 dB	–63 dB
Intermodulation	–75 dB	–75 dB	–75 dB	–75 dB
Spurious & Image Rejection	–75 dB	–75 dB	–75 dB	–75 dB
FM Hum and Noise				
25 kHz channels	–40 dB	–40 dB	–40 dB	–40 dB
12.5 kHz channels	–35 dB	–35 dB	–35 dB	–35 dB
Audio Distortion	2%	2%	2%	2%

All specifications are measured per TIA 102.CAAA, TIA 102.CAAB and per TIA 603 standards.

BATTERIES			
Battery Type	Dimensions (HxWxD)	Weight	Approx. Life (5/5/90)
Extra-High Capacity NiMH	6.0" x 2.3" x 0.85"	0.81 lbs	UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours
Extra-High Capacity NiMH, IS	6.0" x 2.3" x 0.85"	0.81 lbs	UHF/VHF: Minimum 10 hours 700/800 MHz: Minimum 12 hours
Alkaline Battery Clamshell	7.2" x 2.6" x 2.0"	0.98 lbs (w/12 AA batt.)	14–16 hours

ENVIRONMENTAL SPECIFICATIONS

Environment	Mil Spec 810C		Mil Spec 810D		Mil Spec 810E		Mil Spec 810F	
	M	P	M	P	M	P	M	P
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II
High Temp.	501.1	I	501.2	I, II	501.3	I, II	501.4	I, II
Low Temp.	502.1	I	502.2	I, II	502.3	I, II	502.4	I, II
Temp. Shock	503.1	I	503.2	I	503.3	I	503.4	I
Solar Radiation	505.1	I	505.2	I	505.3	I	505.4	I
Rain/Blown Rain	506.1	I, II	506.2	II	506.3	I, II	506.4	I, II
Humidity	507.1	II	507.2	II, III	507.3	II, III		
Salt Fog	509.1	I	509.2	I	509.3	I		
Dust and Sand	510.1	I	510.2	I	510.3	I	510.4	I
Vibration	514.2 VII, VIII		514.3 I(8)		514.4 I(8)		514.5 I(24)	
Shock	516.2 I, II, V		516.3 I, IV, VI		516.4 I, IV, VI		516.5 I, IV, VI	

M=Method P=Procedure

ENCRYPTION OPTIONS

Supported Encryption Algorithms	DES, DES-OFB
Encryption Keys/Radio	16 Common Key Reference (CKR) 16 Physical Identifier (PID) Compatible with Motorola Key Variable Loader
Encryption Frame Re-sync Interval	P25 CAI 360 msec
Encryption Keying	External Key Loader, OTAR
Synchronization	CFB – Cipher Feedback OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Erasure	Keyboard Command
Code Key Initialization	Internal pseudorandom generator

FACTORY MUTUAL APPROVALS

Intrinsically Safe		
Class I	Division 1 An area where there is or could be an explosive atmosphere most of the time in normal conditions.	C Ethylene D Propane and Methane E Conductive metal F Carbonaceous material coal, coke dust G Grain dust and flour
Class II		
Class III	Division 1 Location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.	Ignitable fibers or flyings
Non-Incendive		
Class I	Division 2 An area where an explosive atmosphere exists only as a result of a fault.	A Acetylene B Hydrogen C Ethylene D Propane and Methane



EFJohnson
Our Mission—Your Safety

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www.EFJohnson.com



Ascend™ Series Portable Radio

700/800 900

EFJohnson's Ascend™ Series Portable Radio is rugged, lightweight, and versatile and is primarily designed for Multi-Net® LMR applications. A significant additional benefit of this radio is that it is also a multi-protocol device, which means that the radio can operate on conventional and trunking infrastructures, and in both analog and digital applications. It provides a seamless evolution to next generation networks while offering investment protection for your present communications system; all in a powerful software-controlled device that is easy on your mind and your budget. If you need a Multi-Net portable radio that leads the industry in feature richness, multi-protocol capability, and system interoperability, then the Ascend Series Portable Radio is your clear product choice.



Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), Project 25 Trunked and Conventional system protocols.

Multi-Net Compatibility

Provides a next generation product that supports the Multi-Net Trunked system protocol.

Industry's only SMARTNET® II / SmartZone® Licensee

Industry's only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

Multiple Configuration Offerings

Includes a Model II (display, basic keypad) and a Model III (display, DTMF keypad) version that features an enhanced backlit display and backlit keypad for easier viewing and usage.

Significant Product Flexibility

Enables programming of up to 512 channel/talkgroups, supports both narrowband (12.5 kHz) and wideband (25 kHz) channel spacing, and multiple system protocols.

Simplified Feature Modifications and Updates

Easy radio programming and feature updating using EFJohnson's PC Configure™ application.

Extensive Accessory Suite

Complete line of accessory products including speaker microphones, headsets, surveillance kits, batteries, chargers, carrying apparatus, and encryption "keyloading" devices.

Enhanced Product Robustness

Meets applicable Mil Standard 810C, D, E, and F specifications, as well as approved by Factory Mutual as intrinsically safe for use in hazardous environments.

Ascend™ Series Portable Radio

Typical Performance Specifications

GENERAL	700/800	900*
Frequency Range	762–806 MHz 806-870 MHz	896-940 MHz
Channel Spacing	12.5 kHz, 25 kHz	12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit
FCC Type Acceptance Certification	ATH2425171	ATH2425191
Industry Canada Type Certification	IC: 933B-2425171	
FCC Emissions Designators	11K0F3E, 16K0F3E, 14K0F3E, 8K10F1E, 8K10F1D	11K0F3E, 8K10F1E, 8K10F1D
Input Voltage	7.2 V	
Dimensions (w/o antenna) (HxWxD)	6.7" x 2.52" x 1.9" (6.4 cm x 17.0 cm x 4.8 cm)	
Weight (with standard battery)	24 oz. (675 g)	
Case	Polycarbonate-black, yellow, orange	
Temperature Range	–30°C to +60°C	

TRANSMITTER

RF Power Output	2.5/1 W (700 MHz), 3/1 W (800 MHz)	2.5/1 W
Frequency Stability (–30°C to +60°C)	±1.5 ppm	±1.5 ppm
Modulation Limiting		
25 kHz channels	±5 kHz	
12.5 kHz channels	±2.5 kHz	±2.5 kHz
Emissions (Conducted/Radiated)	–75 dBc	–70 dBc
Audio Response	+1, -3dB	+1, -3dB
FM Hum and Noise		
25 kHz channels	-40 dB	
12.5 kHz channels	-35 dB	-35 dB
Audio Distortion	2%	2%

RECEIVER

Audio Output Power	500 mW	500 mW
Frequency Stability (–30°C to +60°C)	±1.5 ppm	±1.5 ppm
Sensitivity		
Analog Mode: 12 dB SINAD	0.25 µV (-119 dBm)	0.25 µV (-119 dBm)
Digital Mode: 5% BER	0.25 µV (-119 dBm)	0.25 µV (-119 dBm)
Selectivity		
25 kHz channels	-75 dB	
12.5 kHz channels	-63 dB	-63 dB
Intermodulation	–75 dB	–75 dB
Spurious & Image Rejection	–75 dB	–75 dB
FM Hum and Noise		
25 kHz channels	-40 dB	
12.5 kHz channels	-35 dB	-35 dB
Audio Distortion	2%	2%

All specifications are measured per TIA 102.CAAA, TIA 102.CAAB and per TIA 603 standards.

BATTERIES

Battery Type	Dimensions (HxWxD)	Weight	Aprox. Life (5/5/90) (With Encryption/Without Encryption)
Extra-High Capacity NiMH	6.0" x 2.3" x 0.85"	0.81 lbs	12 hrs/13 hrs
Extra-High Capacity NiMH, IS	6.0" x 2.3" x 0.85"	0.81 lbs	12 hrs/13 hrs
Alkaline Battery Clamshell	7.2" x 2.6" x 2.0"	0.98 lbs (w/12 AA batt.)	14-16 hrs/16-18 hrs

*900 MHz option only supports Multi-Net Analog operation.

ENVIRONMENTAL SPECIFICATIONS

Environment	Mil Spec 810C M P	Mil Spec 810D M P	Mil Spec 810E M P	Mil Spec 810F M P
Low Pressure	500.1 I	500.2 II	500.3 II	500.4 II
High Temp.	501.1 I	501.2 I, II	501.3 I, II	501.4 I, II
Low Temp.	502.1 I	502.2 I, II	502.3 I, II	502.4 I, II
Temp. Shock	503.1 I	503.2 I	503.3 I	503.4 I
Solar Radiation	505.1 I	505.2 I	505.3 I	505.4 I
Rain/Blown Rain	506.1 I, II	506.2 II	506.3 I, II	506.4 I, II
Humidity	507.1 II	507.2 II, III	507.3 II, III	
Salt Fog	509.1 I	509.2 I	509.3 I	
Dust and Sand	510.1 I	510.2 I	510.3 I	510.4 I
Vibration	514.2 VII, VIII	514.3 I(8)	514.4 I(8)	514.5 I(24)
Shock	516.2 I, II, V	516.3 I, IV, VI	516.4 I, IV, VI	516.5 I, IV, VI

M=Method P=Procedure

FACTORY MUTUAL APPROVALS

Intrinsically Safe

Class I Division 1 An area where there is or could be an explosive atmosphere most of the time in normal conditions.

Class II

Class III Division 1 Location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.

C Ethylene
D Propane and Methane
E Conductive metal
F Carbonaceous material coal, coke dust
G Grain dust and flour

Ignitable fibers or flyings

Non-Incendive

Class I Division 2 An area where an explosive atmosphere exists only as a result of a fault.

A Acetylene
B Hydrogen
C Ethylene
D Propane and Methane



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Our Mission—Your Safety

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www.EFJohnson.com



5100 Series Portable Radio Accessories 700/800 VHF UHF

EFJohnson's 5100 Series Portable Radio is supported by a complete suite of accessory products. Included in this suite are antennas, speaker microphones, headsets, surveillance kits, batteries, chargers, carrying apparatus, encryption "keyloading" devices, and programming accessories.

Additionally, EFJohnson has developed significant relationships with many of the industry's leading accessory vendors to ensure that the 5100 Series Portable Radio is interoperable in "specialized" LMR market applications. Such applications include operation in high noise, HAZMAT, and extreme surveillance environments.



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

Key Accessory Types

Antennas

A variety of products including 700/800 MHz, VHF, and UHF antennas.

Audio

Complete line of speaker microphones, headsets, and surveillance kits.

Batteries

Numerous battery capacity and chemistry types, as well as an Alkaline Battery Clamshell product when charging capabilities are not available.

Chargers

Extensive charger offerings including 120/230V operation, single and multi-bay configurations, wall mounting apparatus, and vehicular chargers.

Carrying Apparatus

Multiple carrying choices including cases, belt loops, and belt clips.

Encryption "Keyloading" Devices

The Subscriber Management Assistant (SMA) provides an encryption keyloading application for EFJohnson radios.

Programming

Easy radio programming and feature upgrading using EFJohnson's PC Configure™ application.

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Subscriber Management Assistant

The EFJohnson® Subscriber Management Assistant (SMA) is a versatile tool, but its predominant function is for fast and easy encryption key loading. Since the SMA uses PDA technology in a ruggedized case, it can be used in almost any environment. The SMA connects to an EFJohnson radio via a serial interface. All configuration and modifications are completed through the serial interface. It uses the FIPS validated SEM security algorithms for all security functions, including AES and DES. With its Microsoft Windows® based graphical user interface, the SMA will have you configuring your radios right away.



The SMA enables you to:

- Generate a random DES Key or AES Keys for download to EFJohnson portable radios in CKR mode
- Enter your own AES or DES key for download into a portable radio
- Use the Microsoft SQL CE database for storage of security parameters such as AES and DES keys



Connect to radios

For keyloading functionality, the SMA connects to radios via a special keyloader cable.

EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

- Minimize your learning curve with an intuitive graphical interface
- Read radio key set information
- Erase all keys from a radio
- Retrieve hardware revision information from the radio
- Select a key set and make that key set active, modify and set KEK parameters, set KMF parameters on the radio, and set or modify RSI parameters
- Create a new database containing security parameters such as AES and DES keys
- Delete or modify an existing database containing security parameters such as AES and DES keys
- Encrypt all keys stored in the SQL CE using a 256-bit AES key
- SMA package includes case and adapter cable

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Subscriber Management Assistant (SMA)

Typical Specifications as of August, 2006

SYSTEM FEATURES

Device	HP iPAQ hx2490 Pocket PC
Operating System	Microsoft® Windows Mobile™ 5.0 for Pocket PC, Premium Edition
Processor	Intel® PXA270 Processor 520 MHz

MEMORY

Available Memory	64 MB SDRAM
Flash Memory	192 MB

AUDIO, SLOTS AND PORTS

Ports	1 Serial
	1 USB
	1 IrDA
	1 Interfaces
Slots	1 Type II
	1 Support 1-bit SDIO and 4-bit
	SD/MMC type memory standard

GRAPHICS AND INPUT/OUTPUT DEVICES

Input Devices	Touch-sensitive display for stylus or fingertip
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SOFTWARE

Pre-Installed Software	Outlook 2002, Microsoft ActiveSync 3.7.1, Microsoft Reader eBooks
Software Included (ROM)	ActiveSync, Adobe Reader for PC,
	ClearVUE Suite (Word and Excel, PPT and PDF),
	Outlook 2002 Desktop, WorldMate and Media Player Desktop
Key Management Software	EFJohnson® Key Set Creation and Management Application

MANAGEABILITY

Security Management	HP ProtectTools secured by CREDANT Technologies
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PRODUCT SPECIFICATIONS

Dimensions (h x w x d)	4.71 x 3.01 x 0.65 in (119.4 x 76.6 x 16.3 mm)
Weight	5.8 oz (164.4 g)

ACCESSORIES INCLUDED

Case	Lightweight, aircraft-grade aluminum case precisely molded to fit the SMA with neoprene lining to protect against drops
Cable	Adapter cable to connect to EFJohnson radio programming cables Additional cable required for programming

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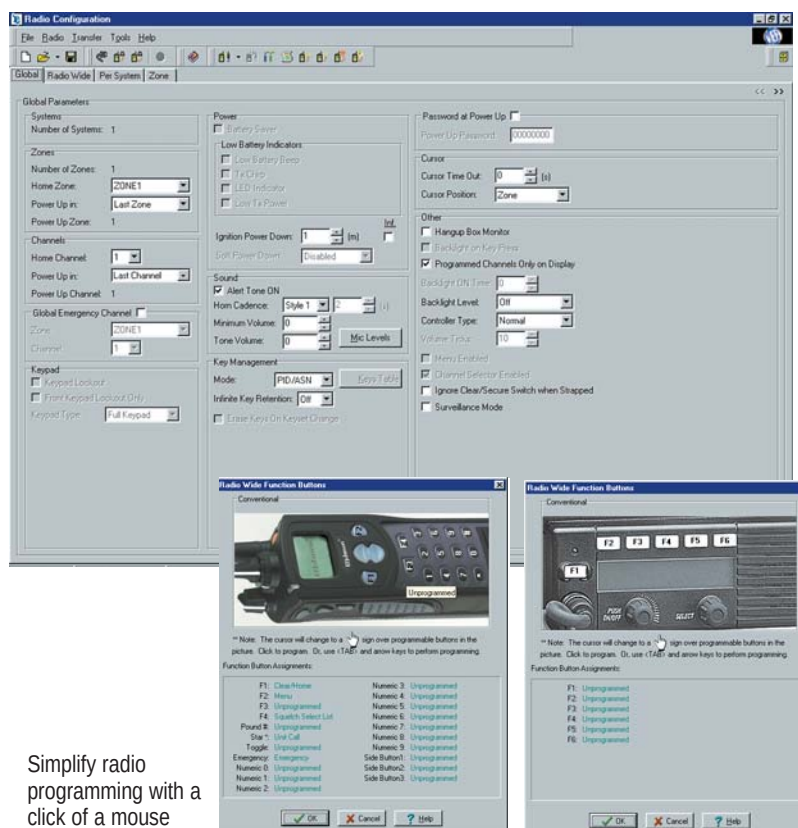
PC Configure™ Programming Software

EFJohnson's PC Configure™ software is the most user-friendly programming software for public safety and service radio users. Program all of your EFJohnson® mobile and portable radios quickly and easily with the same software package. With minimal setup time or training, PC Configure gives you the flexibility to program your EFJohnson 5100, 51SL, and Ascend™ Series Portable as well as 5300, 53SL, and Ascend Series Mobile radios for any encryption or system type installed on the radio.

PC Configure is a Windows®-based application. With its intuitive and unique graphical display, PC Configure allows you to re-reflash radios much faster than any other radio programming software. PC Configure's "remember" function stores previously programmed parameters (such as software version or options) and recalls them for future use.



Manage encryption keys, channels, zones, and other vital radio functions – all from your PC



Simplify radio programming with a click of a mouse

EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

- Minimize your learning curve with an intuitive graphical interface
- Configure mobile and portable radios with a single software package
- Switch between radio and system parameters, and program zone and channel properties with the click of a mouse
- Program your radios in analog conventional, Multi-Net®, Project 25 conventional and trunking, and SMARTNET®/SmartZone®
- Use one template to program multiple radios – simply change unit IDs and download the file to each radio

Computer Requirements

800 MHz Pentium or greater
128 MB RAM
40 MB hard disk space
CD-ROM drive

The portability of the software lets you program your radios anywhere.



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Enhanced System Key™ (ESK)



Protect your radio programming authorizations with the EFJohnson Enhanced System Key™ (ESK). Based on the SafeNet Sentinel Ultra ProUSB Dongle, data is protected with AES encryption algorithms – providing extra security when distributing EFJohnson Enhanced ESKs throughout your organization. It can support up to four EFJohnson System Keys.

The Enhanced ESK communicates with EFJohnson's PC Configure™ Version 2.1.0 software when connected to a computer's USB port, enabling authorized users to program radios according to specified system key information.

With two ESK versions – a Master System Key and a Slave System Key – to accommodate your security needs, each is user-friendly and customizable.

Master System Key (MSK)

This hardware version of the ESK provides full access to all PCConfigure features. Program up to 4 System Keys into the MSK, and up to 3 Unit ID ranges and 5 Talk Group ID ranges from each of these System Keys.

Slave System Key (SSK)

Limit access to system key functionality to your selected ranges of Unit IDs and Talk Group IDs from the MSK. Track issued SSKs throughout your agencies by assigning a serial number. Enter an expiration date for added security.

EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

Key Features and Benefits

- EFJohnson subscriber radios and the ESK functionality are fully compatible with SMARTNET® II / SmartZone®, and Project 25 Trunked and Conventional systems
- Enables a single programming file to contain up to 4 systems, i.e. 2 SMARTNET, 1 SmartZone, and 1 P25 Trunked system — each with their own unique restrictions
- Manage your programming keys in a very efficient and secure method
- Delegate authority to allow groups to program only what they should be authorized to program using EFJohnson's Slave Key

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SMARTNET and SmartZone are trademarks of Motorola, Inc.

Mobiles

5300^{Series} Mobile Radio

700/800 VHF UHF

The 5300 Series Mobile Radio is a very capable and flexible tool designed for demanding public safety communications applications. The ability to seamlessly interoperate with analog and digital, wideband and narrowband, and a wide variety of trunking protocols – all installed simultaneously in the same radio – makes this mobile ideal for migrating critical systems to the latest open standards. This flexibility helps protect your investment in the future as well as maximizing interoperability among most installed systems.



Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), P25 Trunked and Conventional system protocols, and P25 Over-The-Air Rekeying (OTAR).



Industry's Only SMARTNET® II / SmartZone® Licensee

Industry's only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.



Numerous Encryption Protocols

Supports industry standard encryption capabilities such as AES, DES-OFB, and DES. Ask about our free Single Key DES-OFB encryption for P25.



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

Robust and Flexible

- 512 Channels / Talkgroups
- P25 Digital and Analog
- Supported Protocols Installed Simultaneously
- DES, DES-OFB, & AES Encryption
- P25 Conventional & Trunked OTAR
- Supports Key Elements of MDC1200
- Compatible with Motorola Astro®
- Supports Motorola® System v6.5

Trunking

- SMARTNET II / SmartZone
- P25

Data and Control Interfaces

- Supports P25 Conventional IP Packet Data
- Supports GPS AVL Data
- Radio Control Available to 3rd Party Developers

Simplified Feature Updates and Option Selection

- Flexible Programming
- PC Configure™ Software Tool

Multiple Configuration Options

- Dash-Mount
- Trunk-Mount
- 2 Control Heads
- Hand-Held Controller
- Internal or External Speaker
- Fixed Control Stations
- Siren Option
- Motorcycle Configuration

5300^{Series} Mobile Radio

Typical Performance Specifications

GENERAL	700/800 30/35 W	VHF, 50W	VHF, 100W	UHF R1, 40 W	UHF R2, 40 W
Frequency Range (band splits)	762-870 MHz	136-174 MHz	146-174 MHz	380-470 MHz	450-512 MHz
Channel Spacing					
Analog	25,12.5 kHz				
P25 Digital	12.5 kHz				
Maximum Frequency Separation	Full Band Split				
Display	Backlit LCD. 10 alpha-numeric characters plus Zone, Ch, & Status. Electronically adjustable viewing angle				
Power Supply					
Nominal Voltage (negative ground)	13.6 VDC				
Operating Supply Voltage Range	10.9 ~ 16.3 VDC				
Standby Current (back-light off)	700 mA				
Receive Current at Rated Audio Power	2.7 A				
Current at Max Rated Transmit Power	15 A	14.5 A	30 A	12 A	12 A
Temperature Range					
Operating	-30°C to +60°C				
Storage	-40°C to +85°C				
Nominal Dimensions (H x W x D)	5.3 x 18.2 x 21.1 cm	5.3 x 18.2 x 21.1 cm	5.3 x 18.2 x 35.5 cm	5.3 x 18.2 x 21.1 cm	5.3 x 18.2 x 21.1 cm
exclusive of mounting, cables, knobs	(2.1 x 7.2 x 8.3 in)	(2.1 x 7.2 x 8.3 in)	(2.1 x 7.2 x 14 in)	(2.1 x 7.2 x 8.3 in)	(2.1 x 7.2 x 8.3 in)
Nominal Weight	2.3 kg (5.5 lb)	2.3 kg (5.5 lb)	3.9 kg (8.5 lb)	2.3 kg (5.5 lb)	2.3 kg (5.5 lb)
FCC ID	ATH2425371	ATH2425311	ATH2425312	ATH2425331	ATH2425341
Industry Canada	IC: 933B-2425371	IC: 933B-2425311	IC: 933B-2425312	IC: 933B-2425331	IC: 933B-2425341

TRANSMITTER					
RF Output Power (variable)	10-30 W (762-806 MHz) 10-35 W (806-870 MHz)	10 W ~ 50 W	50 W ~ 100 W	10 W ~ 40 W	10 W ~ 40 W
Transmitter Frequency Range(s)	762-776, 792-806, 806-825, 851-870 MHz	136 ~ 174 MHz	146 ~ 174 MHz	380 ~ 470 MHz	450 ~ 512 MHz
Maximum Frequency Separation	Full Band Split				
Frequency Accuracy* (-30°C ~ +60°C, +25°C ref.)	±1.5 ppm				
Modulation Limiting					
25 kHz channels	±5 kHz				
12.5 kHz channels	±2.5 kHz				
Modulation Fidelity (C4FM, 12.5 KHz Digital)	<5%				
Spurious Emissions	-75 dBc				
Audio					
Analog Freq. Resp. (TIA 6dB/octave pre-emphasis)	+1, -3 dB				
FM Hum and Noise Ratio (25 kHz Analog)	40 dB	45 dB	45 dB	45 dB	45 dB
FM Hum and Noise Ratio (12.5 kHz Analog)	34 dB	39 dB	39 dB	39 dB	39 dB
Distortion	2%				
FCC Emission Designators	8K10F1D, 8K10F1E, 11K0F3E, 16K0F3E	8K10F1D, 8K10F1E, 11K0F3E, 16K0F3E			

RECEIVER					
Receiver Frequency Ranges	762-776, 851-870 MHz	136-174 MHz	146-174 MHz	380-470 MHz	450-512 MHz
Maximum Frequency Separation	Full Band Split				
Sensitivity					
Analog Mode: 12 dB SINAD (25 & 12.5 kHz)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)
Digital Mode: (5% BER)**	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)
Selectivity					
25 kHz Channels	-75 dB				
12.5 kHz Channels	-63 dB				
Intermodulation	-73 dB	-75 dB	-75 dB	-75 dB	-75 dB
Spurious Response Rejection	-75 dB	-75 dB	-75 dB	-75 dB	-75 dB
Audio					
Analog Freq. Resp. (TIA 6dB/octave pre-emphasis)	+1, -3 dB				
Output Power (3 Ω load)	12 W rms				
Distortion (1 kHz, 60% Deviation)	<3%				

*FCC Part 90.213

**Measured in digital mode per TIA/EIA 102. CAAA and TIA 102.CAAB Standards.

ENVIRONMENTAL SPECIFICATIONS

Environment	Mil Spec 810C		Mil Spec 810D		Mil Spec 810E		Mil Spec 810F	
	M	P	M	P	M	P	M	P
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II
High Temp.	501.1	I	501.2	I, II	501.3	I, II	501.4	I, II
Low Temp.	502.1	I	502.2	I, II	502.3	I, II	502.4	I, II
Temp. Shock	503.1	I	503.2	I	503.3	I	503.4	I
Solar Radiation	505.1	I	505.2	I	505.3	I	505.4	I
Rain/Blown Rain	506.1	I, II	506.2	II	506.3	I, II	506.4	I, II
Humidity	507.1	II	507.2	II, III	507.3	II, III		
Salt Fog	509.1	I	509.2	I	509.3	I		
Dust and Sand	510.1	I	510.2	I	510.3	I	510.4	I
Vibration	514.2	VII, VIII	514.3	I(8)	514.4	I(8)	514.5	I(24)
Shock	516.2	I, II, V	516.3	I, IV, VI	516.4	I, IV, VI	516.5	I, IV, VI

M=Method P=Procedure

ENCRYPTION OPTIONS

Supported Encryption Algorithms	DES, DES-OFB, AES
Encryption Keys/Radio	16 Common Key Reference (CKR) 16 Physical Identifier (PID) Compatible with Motorola Key Variable Loader
Encryption Frame Re-sync Interval	P25 CAI 360 msec
Encryption Keying	External Key Loader, OTAR
Synchronization	CFB – Cipher Feedback OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Erasure	Keyboard Command
Code Key Initialization	Internal pseudorandom generator
Standards	FIPS 46-3, FIPS 81, FIPS 140-2, FIPS 197

ACCESSORIES

- Antennas
- Keypad Microphones
- Desk Microphones
- Hand-Held Controller
- Remote Control Heads
- External Speakers
- Power Supplies
- Control Station Components
- Tone Remotes
- Encryption Key Management Tools
- Radio Programming Tools
- Mounting Hardware
- Siren

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53SL^{Series} Mobile Radio

700/800 VHF UHF

The 53SL Series Mobile Radio is a very capable and flexible tool designed for demanding public safety communications applications. The ability to seamlessly interoperate with analog and digital, wideband and narrowband, and a wide variety of trunking protocols – all installed simultaneously in the same radio – makes this mobile ideal for migrating critical systems to the latest open standards. This flexibility helps protect your investment in the future as well as maximizing interoperability among most installed systems.



Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), P25 Trunked and Conventional system protocols, and P25 Over-The-Air Rekeying (OTAR).



Industry's Only SMARTNET® II / SmartZone® Licensee

Industry's only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.



Encryption

Supports DES and industry standard P25 digital DES-OFB. Ask about our free Single Key DES-OFB encryption for P25.



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

Robust and Flexible

- 512 Channels / Talkgroups
- P25 Digital and Analog
- Supported Protocols Installed Simultaneously
- DES & DES-OFB Encryption
- P25 Conventional & Trunked OTAR
- Supports Key Elements of MDC1200
- Compatible with Motorola Astro®
- Supports Motorola® System v6.5

Trunking

- SMARTNET II / SmartZone
- P25

Data and Control Interfaces

- Supports P25 Conventional IP Packet Data
- Supports GPS AVL Data
- Radio Control Available to 3rd Party Developers

Simplified Feature Updates and Option Selection

- Flexible Programming
- PC Configure™ Software Tool

Multiple Configuration Options

- Dash-Mount
- Trunk-Mount
- 2 Control Heads
- Hand-Held Controller
- Internal or External Speaker
- Fixed Control Stations
- Siren Option

53SL^{Series} Mobile Radio

Typical Performance Specifications

GENERAL	700/800 30/35 W	VHF, 50W	VHF, 100W	UHF, R1 40 W	UHF, R2 40 W
Frequency Range (band splits)	762~870 MHz	136~174 MHz	146-174 MHz	380-470 MHz	450-512 MHz
Channel Spacing					
Analog	25,12.5 kHz				
P25 Digital	12.5 kHz				
Maximum Frequency Separation	Full Band Split				
Display	Backlit LCD. 10 alpha-numeric characters plus Zone, Ch, & Status. Electronically adjustable viewing angle				
Power Supply					
Nominal Voltage (negative ground)	13.6 VDC				
Operating Supply Voltage Range	10.9 ~ 16.3 VDC				
Standby Current (back-light off)	700 mA				
Receive Current at Rated Audio Power	2.7 A				
Current at Max Rated Transmit Power	15 A	14.5 A	30 A	12 A	12 A
Temperature Range					
Operating	-30°C to +60°C				
Storage	-40°C to +85°C				
Nominal Dimensions (H x W x D)	5.3 x 18.2 x 21.1 cm	5.3 x 18.2 x 21.1 cm	5.3 x 18.2 x 35.5 cm	5.3 x 18.2 x 21.1 cm	5.3 x 18.2 x 21.1 cm
exclusive of mounting, cables, knobs	(2.1 x 7.2 x 8.3 in)	(2.1 x 7.2 x 8.3 in)	(2.1 x 7.2 x 14 in)	(2.1 x 7.2 x 8.3 in)	(2.1 x 7.2 x 8.3 in)
Nominal Weight	2.3 kg (5.5 lb)	2.3 kg (5.5 lb)	3.9 kg (8.5 lb)	2.3 kg (5.5 lb)	2.3 kg (5.5 lb)
FCC ID	ATH2425371	ATH2425311	ATH2425312	ATH2425331	ATH2425341
Industry Canada	IC: 933B-2425371	IC: 933B-2425311	IC: 933B-2425312	IC: 933B-2425331	IC: 933B-2425341

TRANSMITTER

RF Output Power (variable)	10~30 W (762~806 MHz) 10~35 W (806~870 MHz)	10 W ~ 50 W	50 W ~ 100 W	10 W ~ 40 W	10 W ~ 40 W
Transmitter Frequency Range(s)	762~776, 792~806, 806~825, 851~870 MHz	136 ~ 174 MHz	146 ~174 MHz	380 ~ 470 MHz	450 ~ 512 MHz
Maximum Frequency Separation	Full Band Split				
Frequency Accuracy* (-30°C ~ +60°C, +25°C ref.)	±1.5 ppm				
Modulation Limiting					
25 kHz channels	±5 kHz				
12.5 kHz channels	±2.5 kHz				
Modulation Fidelity (C4FM, 12.5 KHz Digital)	<5%				
Spurious Emissions	-75 dBc				
Audio					
Analog Freq. Resp. (TIA 6dB/octave pre-emphasis)	+1, -3 dB				
FM Hum and Noise Ratio (25 kHz Analog)	45 dB	45 dB	45 dB	45 dB	45 dB
FM Hum and Noise Ratio (12.5 kHz Analog)	40 dB	39 dB	39 dB	39 dB	39 dB
Distortion	2%				
FCC Emission Designators	8K10F1D, 8K10F1E, 11K0F3E, 16K0F3E	8K10F1D, 8K10F1E, 11K0F3E, 16K0F3E			

RECEIVER

Receiver Frequency Ranges	762~776, 851~870 MHz	136~174 MHz	146~174 MHz	380~470 MHz	450-512 MHz
Maximum Frequency Separation	Full Band Split				
Sensitivity					
Analog Mode: 12 dB SINAD (25 & 12.5 kHz)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.35 uV (-116 dBm)
Digital Mode: (5% BER)**	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)	0.25 uV (-119 dBm)
Selectivity					
25 kHz Channels	-75 dB				
12.5 kHz Channels	-63 dB				
Intermodulation	-73 dB	-75 dB	-75 dB	-75 dB	-75 dB
Spurious Response Rejection	-75 dB	-75 dB	-75 dB	-75 dB	-75 dB
Audio					
Analog Freq. Resp. (TIA 6dB/octave pre-emphasis)	+1, -3 dB				
Output Power (3 Ω load)	12 W rms				
Distortion (1 kHz, 60% Deviation)	<3%				

*FCC Part 90.213

**Measured in digital mode per TIA/EIA 102. CAAA and TIA 102.CAAB Standards.

ENVIRONMENTAL SPECIFICATIONS

Environment	Mil Spec 810C		Mil Spec 810D		Mil Spec 810E		Mil Spec 810F	
	M	P	M	P	M	P	M	P
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II
High Temp.	501.1	I	501.2	I, II	501.3	I, II	501.4	I, II
Low Temp.	502.1	I	502.2	I, II	502.3	I, II	502.4	I, II
Temp. Shock	503.1	I	503.2	I	503.3	I	503.4	I
Solar Radiation	505.1	I	505.2	I	505.3	I	505.4	I
Rain/Blown Rain	506.1	I, II	506.2	II	506.3	I, II	506.4	I, II
Humidity	507.1	II	507.2	II, III	507.3	II, III		
Salt Fog	509.1	I	509.2	I	509.3	I		
Dust and Sand	510.1	I	510.2	I	510.3	I	510.4	I
Vibration	514.2 VII, VIII		514.3 I(8)		514.4 I(8)		514.5 I(24)	
Shock	516.2 I, II, V		516.3 I, IV, VI		516.4 I, IV, VI		516.5 I, IV, VI	

M=Method P=Procedure

ENCRYPTION OPTIONS

Supported Encryption Algorithms	DES, DES-OFB
Encryption Keys/Radio	16 Common Key Reference (CKR) 16 Physical Identifier (PID) Compatible with Motorola Key Variable Loader
Encryption Frame Re-sync Interval	P25 CAI 360 msec
Encryption Keying	External Key Loader, OTAR
Synchronization	CFB – Cipher Feedback OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Erasure	Keyboard Command
Code Key Initialization	Internal pseudorandom generator

ACCESSORIES

- Antennas
- Keypad Microphones
- Desk Microphones
- Hand-Held Controller
- Remote Control Heads
- External Speakers
- Power Supplies
- Control Station Components
- Tone Remotes
- Encryption Key Management Tools
- Radio Programming Tools
- Mounting Hardware
- Siren

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Ascend™ Mobile Radio

700/800 MHz

The Ascend™ Mobile Radio is designed specifically to provide EFJohnson Multi-Net® customers a robust upgrade path to the industry-standard Project 25 Common Air Interface and beyond. This radio provides seamless interoperability among Multi-Net, P25 conventional and trunked, SMARTNET® II / SmartZone® trunked, and conventional analog systems. EFJohnson's Ascend series is the only communications radio available on the market supporting all of these protocols in the same radio. Further, all of these protocols can be installed simultaneously. Once programmed, switching systems is as simple as changing channels.



Project 25 Compliance

Supports Project 25 CAI (Common Air Interface), P25 Trunked and Conventional system protocols, and P25 Over-The-Air Rekeying (OTAR).



Industry's Only SMARTNET® II / SmartZone® Licensee

Industry's only supplier licensed to support both analog and digital SMARTNET II and SmartZone trunking protocols.



Numerous Encryption Protocols
Supports industry standard encryption capabilities such as DES-OFB and DES. Ask about our free Single Key DES-OFB encryption for P25.



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

Robust and Flexible

- 512 Channels / Talkgroups
- P25 Digital and Analog
- Supported Protocols Installed Simultaneously
- P25 Conventional & Trunked OTAR
- Supports Key Elements of MDC1200
- Compatible with Motorola Astro®
- Supports Motorola® System v6.5

Trunking

- EFJohnson's Multi-Net
- SMARTNET II / SmartZone
- P25

Data and Control Interfaces

- Supports P25 Conventional IP Packet Data
- Supports GPS AVL Data
- Radio Control Available to 3rd Party Developers

Simplified Feature Updates and Option Selection

- Flexible Programming
- PC Configure™ Software Tool

Multiple Configuration Options

- Dash-Mount
- Trunk-Mount
- 2 Control Heads
- Hand-Held Controller
- Internal or External Speaker
- Fixed Control Stations
- Siren Option
- Motorcycle Configuration

Ascend™ Mobile Radio

Typical Performance Specifications Subject to Change

GENERAL		700/800 MHz 30/35 W
Frequency Range (band splits)		762–806 MHz
Channel Spacing		
	Analog	25, 12.5 kHz
	P25 Digital	12.5 kHz
Maximum Frequency Separation		Full Bandsplit
Display		Backlit LCD. 10 alpha-numeric characters plus Zone, Ch, & Status. Electronically adjustable viewing angle
Power Output		
Nominal Voltage (negative ground)		13.6 VDC
Operating Supply Voltage Range		10.9 ~ 16.3 VDC
Standby Current (back-light off)		700 mA
Receive Current at Rated Audio Power		2.7 A
Current at Max Rated Transmit Power		15 A
Temperature Range		
	Operating	-30°C to +60°C
	Storage	-40°C to +85°C
Nominal Dimensions (W x H x D)		5.3 x 18.2 x 21.1 cm
exclusive of mounting, cables, knobs		(2.1 x 7.2 x 8.3 in)
Nominal Weight		2.3 kg (5.5 lb)
FCC ID		ATH2425371
Industry Canada		Pending

Temperature Range	
Operating	-30°C to +60°C
Storage	-40°C to +85°C
Nominal Dimensions (W x H x D) exclusive of mounting, cables, knobs	5.3 x 18.2 x 21.1 cm (2.1 x 7.2 x 8.3 in)
Nominal Weight	2.3 kg (5.5 lb)
FCC ID	ATH2425371
Industry Canada	Pending

TRANSMITTER	
RF Output Power (variable)	10-30 W (762-806 MHz) 10-35 W (806-870 MHz)
Transmitter Frequency Range	762-776, 792-806, 806-825, 851-870 MHz
Maximum Frequency Separation	Full Band Split
Frequency Accuracy* (-30°C ~ +60°C, +25°C ref.)	±1.5 ppm
Modulation Limiting	
25 kHz channels	±5 kHz
12.5 kHz channels	±2.5 kHz
Modulation Fidelity (C4FM, 12.5 KHz Digital)	<5%
Spurious Emissions	-75 dBc
Audio	
Analog Freq. Resp. (TIA 6dB/octave pre-emphasis)	+1, -3 dB
FM Hum and Noise Ratio (25 kHz Analog)	40 dB
FM Hum and Noise Ratio (12.5 kHz Analog)	34 dB
Distortion	2%
FCC Emission Designators	8K10F1D, 8K10F1E, 14K0F3E, 16K0F3E, 11KDF3E

*FCC Part 90.213	
**Measured in digital mode per TIA/EIA 102. CAAA and TIA 102.CAAB Standards.	

ENVIRONMENTAL SPECIFICATIONS

Environment	Mil Spec 810C		Mil Spec 810D		Mil Spec 810E		Mil Spec 810F	
	M	P	M	P	M	P	M	P
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II
High Temp.	501.1	I	501.2	I, II	501.3	I, II	501.4	I, II
Low Temp.	502.1	I	502.2	I, II	502.3	I, II	502.4	I, II
Temp. Shock	503.1	I	503.2	I	503.3	I	503.4	I
Solar Radiation	505.1	I	505.2	I	505.3	I	505.4	I
Rain/Blown Rain	506.1	I, II	506.2	II	506.3	I, II	506.4	I, II
Humidity	507.1	II	507.2	II, III	507.3	II, III		
Salt Fog	509.1	I	509.2	I	509.3	I		
Dust and Sand	510.1	I	510.2	I	510.3	I	510.4	I
Vibration	514.2	VII, VIII	514.3	I(8)	514.4	I(8)	514.5	I(24)
Shock	516.2	I, II, V	516.3	I, IV, VI	516.4	I, IV, VI	516.5	I, IV, VI

M=Method P=Procedure

ACCESSORIES

- Antennas
- Keypad Microphones
- Desk Microphones
- Hand-Held Controller
- Remote Control Heads
- External Speakers
- Power Supplies
- Control Station Components
- Tone Remotes
- Encryption Key Management Tools
- Radio Programming Tools
- Mounting Hardware
- Siren

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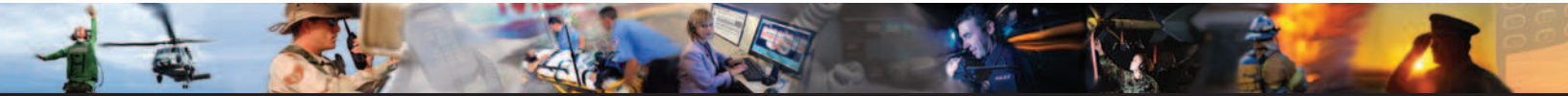
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Mobile Radio Hand-Held Controller 700/800 VHF UHF

The Hand-Held Controller (HHC) is a full-featured, discreet, and convenient alternative to traditional EFJohnson® mobile radio control heads. Designed primarily for law enforcement, surveillance, and executive applications, the HHC provides full radio functionality in the palm of your hand. The HHC is available as a factory option or field-installed upgrade for any remote-control-head 5300 series or Ascend mobile for all frequency bands, power levels, and software options.



Features

- All display functions of the 5300 Series control head
- All six programmable function buttons of the 5300 Series control head
- Adjustable display and keypad backlighting (including "off")
- Multi-function LED indicator
- Volume up/down rocker control
- Channel/zone selection rocker control



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

Bonus Features Above and Beyond Fixed Control Heads

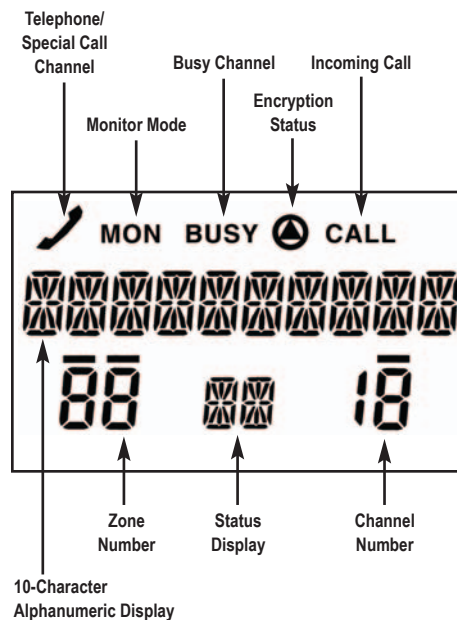
- Dedicated encryption on/off button (top — not shown)
- Numeric Keypad
- Highly flexible mounting locations for convenience or privacy
- HHC can be used anywhere with or without mounting
- Line-level transmit and receive audio via interface box
- Radio programming and encryption key loading via interface box
- Compatible with subscriber programming and encryption tools with adapter
- External speaker jack in interface box

Mobile Radio Hand-Held Controller

HANDHELD CONTROLLER CONTROLS



LCD



Handheld Controller shown with 5326 100-watt trunk-mount mobile and junction box. External speaker (PN 250-0151-005), also shown, is ordered separately.



HHC Kit 250-5300-101

ORDERING INFORMATION

To order with the mobile radio from the factory:

- Select "Remote-Mount Option" No. 5 at time of radio order (Does not include required external speaker.)
- 250-0151-005 5" Environmentally sealed speaker with plug compatible with HHC interface junction box. (Except for phone plug, this speaker is identical to the EFJ standard speaker, 250-0151-006, which has unterminated wires.)

To order as field upgrade:

- Ensure that existing mobile has connection for remote-control head (or has already been used with remote control head).
- 250-5300--101 Field installation HHC Kit includes HHC, interface junction box, 17' radio cable. (Does not include required external speaker.)
- 250-0151-005 5" Environmentally sealed speaker with plug compatible with HHC interface junction box. (Except for phone plug, this speaker is identical to the EFJ standard speaker, 250-0151-006, which has unterminated wires.)

Related Optional Accessories

- 597-2002-267 17' HHC to Radio cable. (Included in HHC Kit). Usually needed only for spares or re-installations
- 023-5300-140 Adapter required to connect radio programming kit cable to HHC interface junction box.

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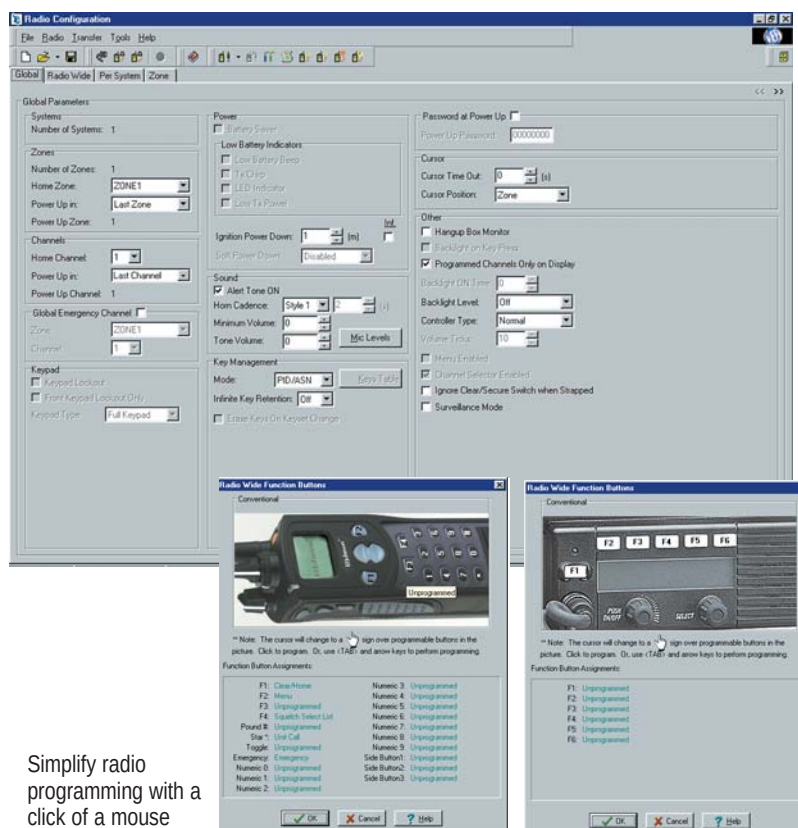
PC Configure™ Programming Software

EFJohnson's PC Configure™ software is the most user-friendly programming software for public safety and service radio users. Program all of your EFJohnson® mobile and portable radios quickly and easily with the same software package. With minimal setup time or training, PC Configure gives you the flexibility to program your EFJohnson 5100, 51SL, and Ascend™ Series Portable as well as 5300, 53SL, and Ascend Series Mobile radios for any encryption or system type installed on the radio.

PC Configure is a Windows®-based application. With its intuitive and unique graphical display, PC Configure allows you to re-reflash radios much faster than any other radio programming software. PC Configure's "remember" function stores previously programmed parameters (such as software version or options) and recalls them for future use.



Manage encryption keys, channels, zones, and other vital radio functions – all from your PC



Simplify radio programming with a click of a mouse

EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

- Minimize your learning curve with an intuitive graphical interface
- Configure mobile and portable radios with a single software package
- Switch between radio and system parameters, and program zone and channel properties with the click of a mouse
- Program your radios in analog conventional, Multi-Net®, Project 25 conventional and trunking, and SMARTNET®/SmartZone®
- Use one template to program multiple radios – simply change unit IDs and download the file to each radio

Computer Requirements

800 MHz Pentium or greater
128 MB RAM
40 MB hard disk space
CD-ROM drive

The portability of the software lets you program your radios anywhere.



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Infrastructure



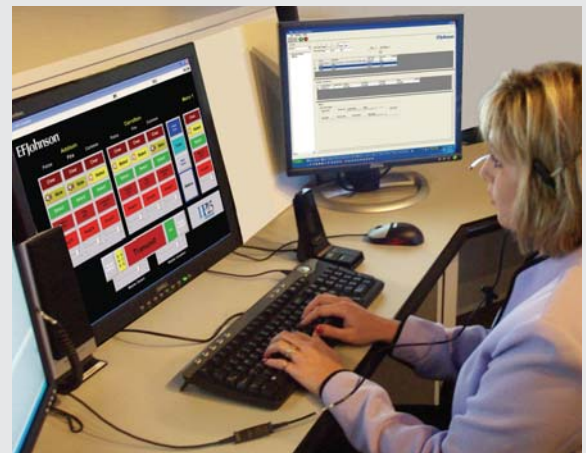
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Trunked IP25™ Infrastructure Systems

First responders need a secure, reliable, and flexible Project 25 trunked communication system. EFJohnson's Trunked IP25™ Infrastructure System is a Project 25 compliant trunked system that is designed specifically for public safety and homeland security, and utilizes Voice over Internet Protocol (VoIP) for system integration.

Trunked IP25 provides a modern trunked P25 infrastructure for all of your communications needs. This modern system meets the National Telecommunications and Information Administration (NTIA) mandates for narrow-band operation in VHF and UHF frequencies as well as Department of Defense mandates for Project 25 compliance.

Trunked IP25 is a switchless end-to-end digital environment. This system solution does not require a traditional network switch or Central Electronics Cabinet to link your consoles or repeaters, rather it uses standard off the shelf IP networking equipment. Your advantages are quicker deployments, fewer network elements to own and maintain, and increased scalability.



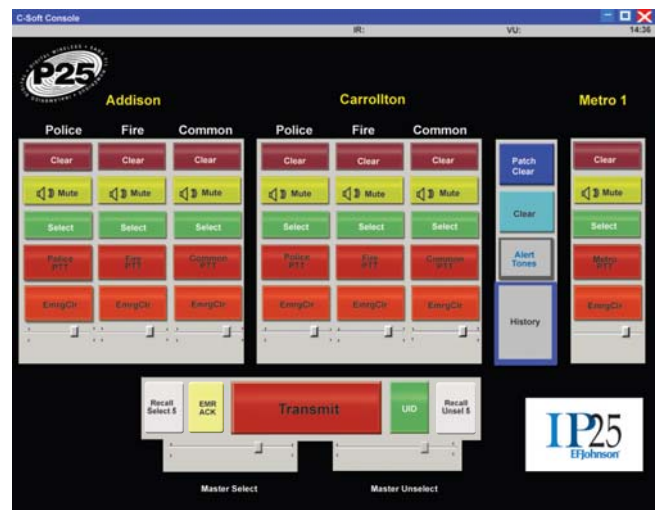
- Reliable
- Secure
- Feature Rich
- Standards Based

Trunked IP25™ Infrastructure Systems

Key Features and Benefits of Trunked IP25

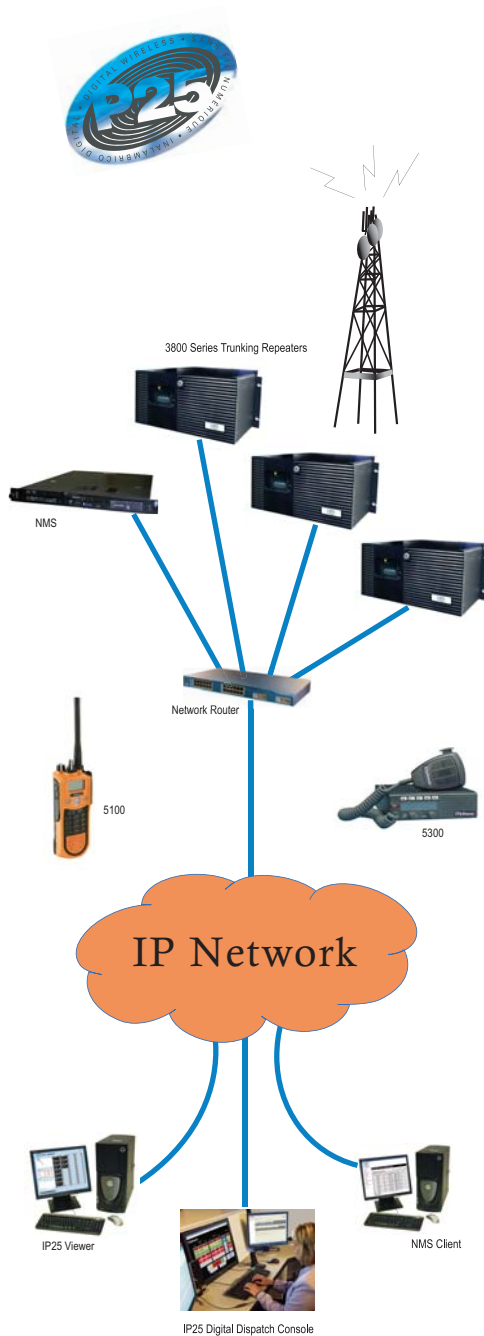
- Interoperability with Legacy Systems
 - Trunked IP25 repeaters operate in P25 Digital mode, providing clean digital communications.
 - EFJohnson's P25 subscriber radios operate in P25 Trunked, P25 Conventional, and SMARTNET®/SmartZone® – all in the same radio! Whether you use EFJohnson's Project 25 subscriber radios or P25 equipment from another supplier, Trunked IP25 provides a secure and reliable P25 system solution.
 - Add or reconfigure radios and other network elements as your needs evolve, over the life of the system.
- Interoperability Across Multiple Agencies
 - Project 25 Common Air Interface (CAI) capability enables users to communicate with other P25 equipment on your network.
 - Analog Conventional, P25 Conventional, and P25 trunked channel access and control provide the critical communications paths to your users.
 - Radio users can talk to each other in the field. Dispatch centers and command/control facilities can easily conference, which enables critical communication paths when time is vital.
 - Total IP-based console eliminates the need for cumbersome electronics cabinets, reduces costs, minimizes foot print, and streamlines maintenance.
- VoIP Technology

All IP25 systems utilize an inherent Voice over Internet Protocol (VoIP) architecture. Each system element from the repeaters to the network management system and the console utilizes IP for sending voice and data across a heterogenous packet network. The advantage of IP is installation or expansion of your network occurs with unprecedented speed and with greater reliability due to the distributed IP architecture. No more cumbersome punch blocks or audio switches with this highly scalable architecture.
- Redundancy and Security
 - Multiple voice channels ensure a high level of redundancy and availability for critical calls.
 - IP25 Integrated Network Controller is integrated into the repeater, which simplifies system management.
 - Trunked IP25 brings encryption and interoperability into the same P25 communications system. FIPS certified, end-to-end encryptions supported include AES and DES-OFB. You can make sure that only the right people are involved in conversations on your system.
 - Tighten security by using the IP25 Key Management Facility (KMF) to perform Over the Air Rekeying (OTAR) of all your radios in the field. KMF provides quick, secure, and complete management of subscriber radios.



IP25 Digital Dispatch Console

Trunked IP25™ Infrastructure Systems



Elements of the Trunked IP25 System Include:

Repeaters

EFJohnson's P25 repeaters provide the solution for Project 25 digital operation in the VHF, UHF, and 800 MHz Band. For added convenience and network management, these repeaters connect directly to the Ethernet network using industry-standard routers. Software defined configurations allow for PC programmability of operating frequency, output power and other functions—providing quick installation capability.

IP25 Digital Dispatch Console

Trunked IP25's Digital Dispatch Console enables all of your first responder groups to be connected. This console operates in Trunked and Conventional modes, which ensures interoperability with legacy systems. The Digital Dispatch Console's OTAR capability provides encryption continuity with the users in the field. You can manage your entire system from one place—anywhere you have a connected computer. Trunked IP25's Digital Dispatch Console operates on Windows®-based PCs.

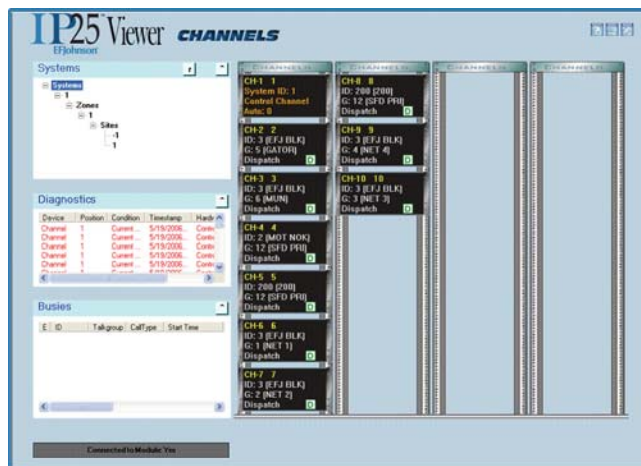
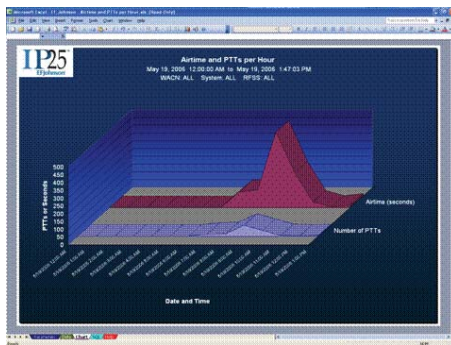
IP25 Network Management System (NMS)

Accessible, intuitive, and powerful. The IP25 Network Management System (NMS) can be accessed by authorized users from any PC with a web browser and network connectivity. User friendly menus and drop down selection boxes make operating the NMS as simple as navigating pages on the Internet. It is a feature rich platform that allows remote configuration and management of the system as well as provides advanced capabilities such as multi-agency partitioning, dynamic regroup, and remote radio disable.

IP25 Viewer

The IP25 Viewer is a suite of software tools that assist the administrator in managing overall performance of the trunking system. Real time scrolling detailed lists or graphical representations of the repeater site can be used to monitor the health of the IP25 Trunking System. A suite of preconfigured reports can be used to observe trends and track system usage.

Trunked IP25™ Infrastructure Systems



Project 25

Telecommunications Industry Association's (TIA) standard for digital 2-way radio technology. Project 25 was originally created by the Association of Public Safety Communications Officials, International (APCO) in cooperation with the National Association of State Telecommunications Directors (NASTD) and the U.S. government to ensure interoperability between Federal, state, and local public safety agencies. EFJohnson was one of the first companies to sign up to develop Project 25 compliant solutions.

About EFJohnson

EFJohnson provides digital Project 25 compliant interoperable wireless communications systems solutions for federal, state and local agencies involved with homeland security and public safety. EFJohnson, founded in 1923, was one of the first developers of wireless communications products to be fully compliant with federal government interoperability specifications.

We design, manufacture and market conventional and trunked radio systems, land mobile radio repeaters, and mobile and portable radios. Our customers tell us that we provide rugged, reliable, and interoperable equipment along with a high level of customer service and support. For a communications system that you can rely on, and a company that is responsive and completely in tune with public safety, turn to one supplier – EFJohnson.

For more information, visit
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3800^{Series} Digital Repeater

EFJohnson's 3800 Series repeaters provide secure digital communications for first responders operating Project 25 trunked networks. As a key piece of the Trunked IP25™ system solution, the 3800 Series delivers performance you can always count on - today and tomorrow.

The 3800 Series repeaters use Voice over Internet Protocol (VoIP) technology to enable intelligent network communications without costly and complex centralized switching equipment. With a trunking controller built into the repeater, network management is right at your fingertips.

PC programmable options provide flexibility, simplified setup, and easy field upgrades. The fully synthesized design of the 3800 Series enables you to make frequency changes quickly and easily. The modular design of the 3800 Series simplifies maintenance and servicing.



EFJohnson is a leading provider of Project 25 compliant two-way radios and communication systems for law enforcement, fire fighters, EMS, and military.

More Key Features and Benefits

- Trunking controller is built into the repeater, which simplifies network management
- Ethernet interface enables easy network connectivity
- Frequency bands available are VHF, UHF, and 800 MHz
- Project 25 Common Air Interface operation
- Each Subsystem can have up to 28 channels (27 for traffic and 1 for control)
- Fits into a standard 19" equipment rack
- Network Management provides automatic configuration of the repeater and remote software upgrades
- Conservative design of power amplifier circuitry uses multiple devices for maximum heat transfer and minimum operating temperatures for long life
- Dual synthesizers with ± 1.0 part per million stability ensure on-frequency operation of transmitter and receiver
- Front panel status indicators show operating status and diagnostic information for rapid evaluation and servicing
- DSP Processing and flash memory allows updating of radio operating software via the Network Manager to meet future needs

3800^{Series} Digital Repeater

Typical Performance Specifications

GENERAL	38X1 (VHF)	38X4 (UHF)	38X8 (800 MHz)
Mounting	19" rack or shelf		
Dimensions (HxWxD)	9.0" x 17.0" x 20.9" (23cm x 43 cm x 53cm)		
Weight	66 lbs. (29.95 kg)		
Temperature Range	-30°C to +60°C		
Input Voltage	100 to 240 VAC		
Input Frequency	50 to 60 Hz		
Power Requirements	At 110 W - 560 Watts At 25 W - 170 Watts Standby - 45 Watts	At 110 W - 457 Watts At 25 W - 170 Watts Standby - 45 Watts	At 175 W - 680 Watts At 75 W - 450 Watts Standby - 45 Watts
Frequency Resolution	5/6.25 kHz	6.25 kHz	12.5 kHz
FCC Type Acceptance Number	ATH2422001-1	ATH2422004-1	ATH2422008-1
FCC Compliance	Parts 15, 90	Parts 15, 90	Parts 15, 90

TRANSMITTER			
Frequency Range	132-150, 150-178 MHz	400-430, 430-470, 470-512 MHz	851-870 MHz
RF Output Power	25 to 110 Watts	25 to 110 Watts	75 to 175 Watts
Duty Cycle	100%	100%	100%
Output Impedance	50 ohm	50 ohm	50 ohm
Spurious Emissions	-90 dBc	-90 dBc	-90 dBc
Harmonic Emissions	-90 dBc	-90 dBc	-90 dBc
Maximum Deviation	± 3110 Hz	± 3110 Hz	±5.0 kHz / ± 3110 Hz
Emission Designators	8K10F1E	8K10F1E	8K10F1E
Frequency Stability (-30°C to +60°C)	±1.0 PPM	±1.0 PPM	±1.0 PPM

RECEIVER			
Channel Spacing	12.5 kHz	12.5 kHz	12.5 kHz
Frequency Range	132-150, 150-178 MHz	380-400, 400-430, 430-470, 470-512 MHz	806-825 MHz
Sensitivity: for 5% BER	0.25 µV	0.30 µV	0.25 µV
Selectivity	-60 dB	-60 dB	-60 dB
Signal Displacement Bandwidth	± 1 kHz	± 1 kHz	± 1 kHz
Frequency Stability (-30°C to +60°C)	±1.0 PPM	±1.0 PPM	±1.0 PPM
Intermodulation Rejection	-85 dB	-85 dB	-80 dB
Spurious & Image Rejection	-95 dB	-100 dB	-90 dB
RF Input Impedance	50 ohms	50 ohms	50 ohms

STANDARDS COMPLIANCE

EFJohnson's radio repeaters comply with the following standard specifications:

P25 Digital Operation: TIA/TSB 102.CAAB
EMI/EMC: NTIA Manual Chapter 5
FCC Part 90
FCC Part 15
PSTN Line Isolation: FCC Part 68 (USA)

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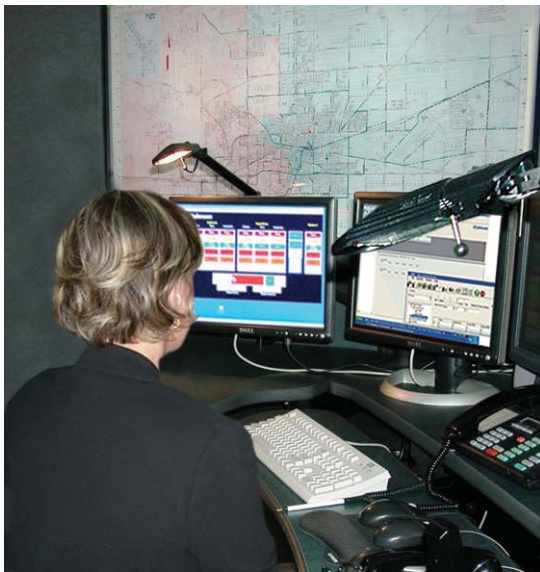
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Phone: 972-819-0700, 1-800-328-3911 Fax: 972-819-0639
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Conventional IP25™ Infrastructure Systems

The Right Choice for Infrastructure

Building out a Project 25 network can be easy, when you make the right choice. Meet the Conventional IP25™ Infrastructure System from EFJohnson. Conventional IP25 provides the secure, reliable infrastructure for your communications needs — today and tomorrow.



Conventional IP25 provides a flexible, cost-effective solution for conventional systems. It delivers a complete Project 25 compliant solution that provides:

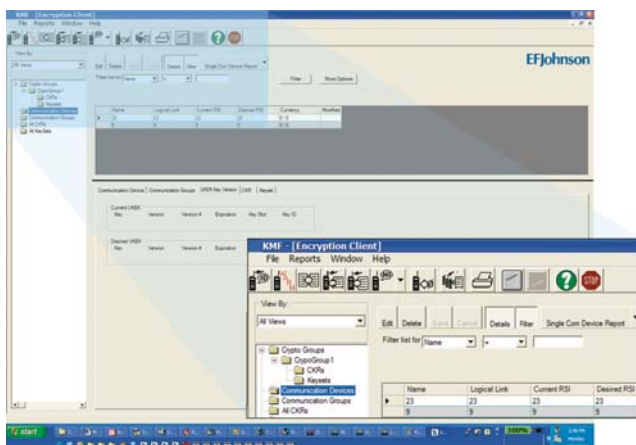
Scalability – cost effective for small, medium and large system deployments

Expandability – new features and capabilities easily added – many with only a new software load

Graceful Migration – ability to migrate from analog to digital systems and to future Project 25 enhancements

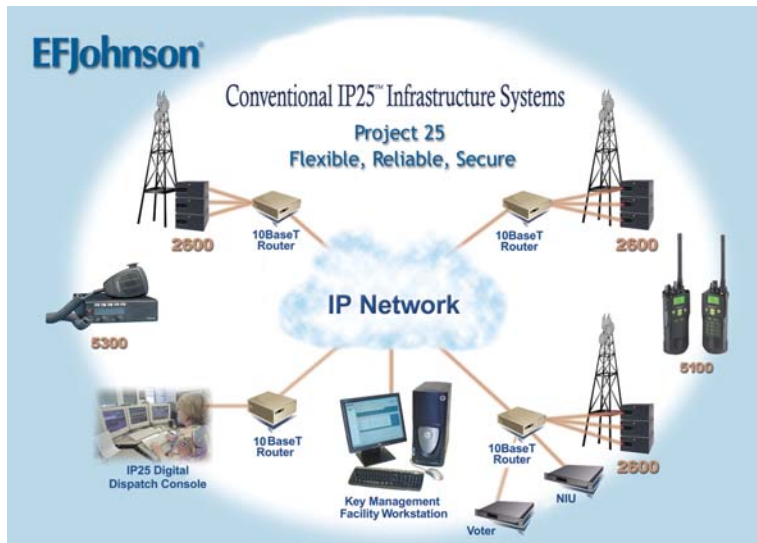
Using industry-standard VoIP technology, Conventional IP25 provides a secure, reliable infrastructure that you can always count on.

Whether you use Conventional IP25 with EFJohnson's proven portable and mobile radios or equipment from another supplier, you'll have a Project 25 network that fulfills your requirements and exceeds your expectations.



Conventional IP25 Infrastructure Systems

The Right Choice for Infrastructure

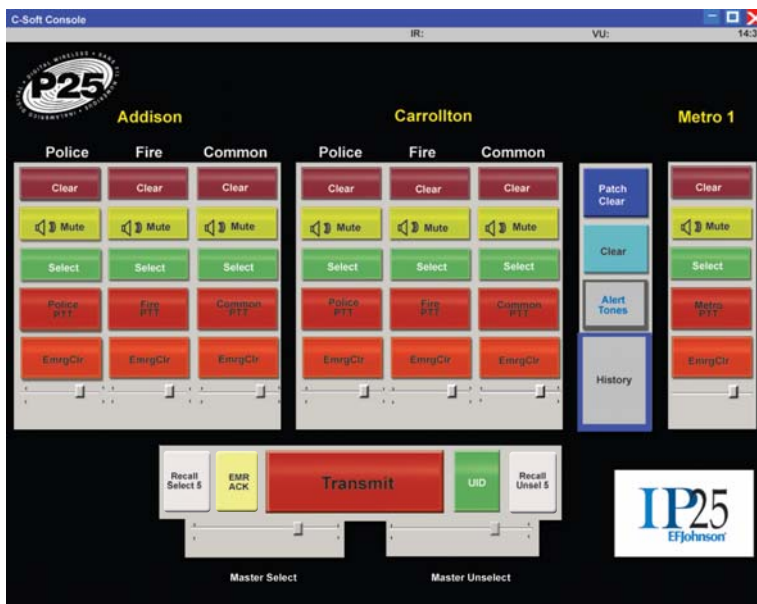


Conventional IP25 Integrates These Elements:

- EFJohnson's powerful base station/repeaters
- Intuitive IP25 Digital Dispatch Console
- Secure Key Management Facility
- IP25 Voter

2600 Series Base Station/Repeaters

These powerful repeaters adaptively support communications of both analog and P25 digital subscriber equipment. For added convenience, the dual mode base station/repeaters interconnect throughout your network using industry-standard routers.



IP25 Digital Dispatch Console

The EFJohnson IP25 Digital Dispatch Console is a software program that provides the interface into the IP25 packet network. You can manage your entire network from one place – anywhere you have a computer. The IP25 Digital Dispatch Console operates on any Windows®-based PC. Its intuitive graphical user interface will have you in complete control in no time. Communicate with P25 radios on your network on an individual basis, or establish talk-groups. The EFJohnson IP25 Digital Dispatch Console enables you to put more consoles in less space than ever before.

Key Management Facility

Maintaining control over the radios on your network is a vital function. EFJohnson's Key Management Facility (KMF) enables you to control every P25 OTAR (Over the Air Re-keying) compliant radio on your network. OTAR capability allows you to re-key your radios in the field, wherever they are and whenever you need them. EFJohnson offers the industry's only PDA-based key loader, which extends your reach even further.

* **Project 25** — Telecommunications Industry Association's (TIA) standard for digital 2-way radio technology. Originally created by the Association of Public Safety Communications Officials, International (APCO) in cooperation with the National Association of State Telecommunications Directors (NASTD) and the U.S. government to ensure interoperability between Federal, State, and local public safety agencies.

Conventional IP25 Infrastructure Systems

The Right Choice for Infrastructure

IP25™
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Network Interface Unit

The Network Interface Unit acts as the gateway between analog dispatch equipment, telephone interconnect devices, and conventional network digital systems.

IP25 Voter

The IP25 Voter uses sophisticated voting algorithms to enhance receive audio quality by receiving and comparing the receive signals from various receivers and selecting the best signal.

Interoperability

At EFJohnson, interoperability is more than just a catch phrase. It's the focus of our business. The IP25 systems are designed to work with any Project 25 compliant radios, not just those designed by EFJohnson. If your equipment is in compliance with P25, you can be certain that it will work on our system.

VoIP Technology

Voice over Internet Protocol (VoIP) is the transfer of voice signals over Internet Protocol. IP is an industry standard protocol that was designed for use in interconnected systems of packet-switched computer communication networks. The advantage of VoIP is you can build out your network at an unprecedented speed, while deploying the latest network technology.

Conventional IP25™ Infrastructure Systems

The Right Choice for Infrastructure

Conventional IP25 Systems

EFJohnson was the first to implement an IP-based, cost effective P25 Conventional System. Designed to support both analog and digital communication, Conventional IP25 enables the co-existence of legacy analog radios and equipment with advanced P25 digital radios and equipment. Instead of overhauling all existing radios in order to take advantage of digital P25 features and capabilities, Conventional IP25 allows you to migrate at your own pace.

Advanced features and wide area capability without the high cost of a trunking system.

The perfect marriage of two standards. Project 25's advanced first responder features and Internet Protocol's heterogeneous packet switched networking.

Highlights:

P25 Conventional System

- Adaptive Analog and Digital mode
- Adaptive 12.5 kHz and 25kHz
- Adaptive Clear or Encrypted communication

IP based architecture

- Intelligent IP based wide area routing
- No expensive Central Electronics Banks

Advanced features

- Individual calls
- Group calls
- Caller Validation
- Transmitter steering

Interoperability

- Multimode (Analog and Digital) Operation
- Cross mode calling (Analog - Digital)
- Cross band calling (UHF, VHF, 800)
- Ethernet to 4-wire conversion for legacy analog devices

Secure

- AES and DES End-to-end Encryption
- Over-the-Air Re-keying using IP25 Key Management Facility

About EFJohnson

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We design, manufacture and market conventional and trunked radio systems, land mobile radio repeaters, and mobile and portable radios. Our customers tell us that we provide rugged, reliable, and interoperable equipment along with a high level of customer service and support. For a communications system that you can rely on, and a company that is responsive and completely in tune with public safety, turn to one supplier – EFJohnson.

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2600^{Series} Digital Repeater/Base Station

EFJohnson's 2600 Series Repeater/Base Station was designed to meet the demanding needs of First Responders. This field-proven product combines performance, reliability and advanced features for worry-free operation when it is needed most.

The 2600 can be configured as a repeater or as a base station in a conventional analog, Project 25 digital or mixed mode network. When operating in mixed mode, it has the ability to detect the signaling mode of an incoming call. It then returns the call back out over the air using the same protocol as was received.

A wide range of receiver protection methods are available including CTCSS, CDCSS and NAC. Up to 50 CTCSS and 18 CDCSS are provided with the community repeater option. Multiple interfaces support network communications: 4-wire analog used to connect the station to a remote controller or analog dispatch equipment, and digital Ethernet used for linking stations or linking the station to dispatch equipment using Voice over IP (VoIP).

The standalone 2600 is a feature-rich product that supports many advanced P25 features such as group calls, emergency and System All Call. But the addition of the IP25TM Network Interface Unit (NIU), a conventional "site controller", the capability is expanded to include such features as unit and talk group validation, and cross-band and cross-mode call routing across multiple sites.

Software defined configurations allow for PC programmability of operating frequency, output power and other functions - providing quick installation capability. Front panel status indicators and two-line display show operating status and provide on-site diagnostics for rapid evaluation and servicing.



Advantages:

■ Standards based

The 2600 Series meets the requirements for Project 25 digital operation and TIA 603 analog operation and will interoperate with similarly compliant radios. The 2600 series also supports Internet Protocol (IP) for VoIP operation.

■ Multiple Modes

The 2600 series repeater can be configured to operate in analog, P25 digital or mixed mode.

■ Multiple Call Types

The 2600 series supports multiple call types including individual and group calls, clear and encrypted calls, and emergency calls.

■ High Power

Adjustable, high TX output power. The VHF and UHF repeaters can be set for 25-110 Watts, and the 800 MHz repeater can be set for 25-175 watts.

■ Inherent IP Architecture

These repeaters include an Ethernet port for 10/100 BaseT connection. IP Networking provides quick intelligent network communications without costly and complex switching equipment.

■ Wide Area Capable

The IP architecture makes it simple to connect 2600 Series Repeaters for wide area applications such as multicasting and transmitter steering.

■ Interoperable with Existing Analog Equipment

The addition of the IP25 Network Interface Unit (NIU) enables advanced P25 features, advanced networking capability, and also serves as a gateway between existing analog 4W equipment and the digital IP25 repeaters and console.

■ Reliable

Conservative design, efficient PA heat sink and continuous performance monitoring ensure highly reliable, worry free operation.

2600^{Series} Digital Repeater/Base Station

Typical Performance Specifications

GENERAL	26X1 (VHF)	26X4 (UHF)	26X8 (800 MHz)
Mounting		19" rack or shelf	
Dimensions (HxWxD)		9.0" x 17.0" x 20.9" (23cm x 43 cm x 53cm)	
Weight		66 lbs. (29.95 kg)	
Temperature Range		-30°C to +60°C	
Input Voltage		100 to 240 VAC	
Input Frequency		50 to 60 Hz	
Power Requirements	At 110 W - 560 Watts At 25 W - 170 Watts Standby - 45 Watts	At 110 W - 457 Watts At 25 W - 170 Watts Standby - 45 Watts	At 175 W - 680 Watts At 75 W - 450 Watts Standby - 45 Watts
Frequency Resolution	5/6.25 kHz	6.25 kHz	12.25 kHz
FCC Type Acceptance Number	ATH2422001-1	ATH2422004-1	ATH2422008-1
FCC Compliance		Parts 15, 90	

TRANSMITTER	ANALOG		DIGITAL		ANALOG		DIGITAL	
Frequency Range	132-150, 150-178 MHz		380-400, 400-430, 430-470, 470-512 MHz		851 - 870 MHz			
RF Output Power	25 to 110 Watts		25 to 110 Watts		75 - 175 Watts			
Duty Cycle			100%					
Output Impedance			50 ohm					
Spurious Emissions			-90 dBc					
Harmonic Emissions			-90 dBc					
Maximum Deviation	± 5 kHz/± 2.5 kHz		± 3110 Hz		± 5 kHz/± 2.5 kHz		± 3110 Hz	
Audio Response	+1, -3 dB TIA		As per TIA		+1, -3 dB TIA		As per TIA	
Audio Distortion	Less than 2%		As per TIA		Less than 2%		As per TIA	
Emission Designators	11K0F3E, 16K0F3E		8K10F1E		11K0F3E, 16K0F3E		8K10F1E	
Hum & Noise (TIA)	-50 / -55 dB		N/A		-50 / -55 dB		N/A	
Frequency Stability (-30°C to +60°C)			±1.0 PPM					

RECEIVER	ANALOG		DIGITAL		ANALOG		DIGITAL	
Channel Spacing	30/25/15/12.5 kHz		12.5 kHz		25/12.5 kHz		12.5 kHz	
Frequency Range	132-150, 150-178 MHz		380-400, 400-430, 430-470, 470-512 MHz		806-825 MHz			
Sensitivity:	12 dB SINAD	0.25µV	N/A	0.30µV	N/A	0.25µV	N/A	0.25µV
Sensitivity:	for 5% BER	N/A	0.25µV	N/A	0.30µV	N/A	0.25µV	0.25µV
Selectivity	-85/-80 dB		-60 dB		-90/-75 dB		-60 dB	
Signal Displacement Bandwidth	± 2 kHz/± 1 kHz		± 1 kHz		± 2 kHz/± 1 kHz		± 1 kHz	
Frequency Stability (-30°C to +60°C)			±1.0 PPM					
Intermodulation Rejection	-85 dB		-85 dB		-80 dB			
Spurious & Image Rejection	-95 dB		-100 dB		-90 dB			
Audio Response (1000 Hz ref.)	+1, -3 dB TIA		As per TIA		+1, -3 dB TIA		As per TIA	
Audio Distortion (at 1000 Hz)	Less than 3% @ 0.5W /16 ohms		As per TIA		Less than 3%		As per TIA	
Hum and Noise (TIA)	-50 dB		N/A		-50 dB		N/A	
RF Input Impedance			50 ohms					
NTIA Certificate Number			JF-129002 (380-400, 400-430 MHz)					

STANDARDS COMPLIANCE

EFJohnson's radio repeaters comply with the following standard specifications:

P25 Digital Operation: TIA/TSB 102.CAAB
 Analog FM Operation: TIA/EIA 603
 EMI/EMC: NTIA Manual Chapter 5
 FCC Part 90
 FCC Part 15
 PSTN Line Isolation: FCC Part 68 (USA)

Five Channels and
7-Foot Rack



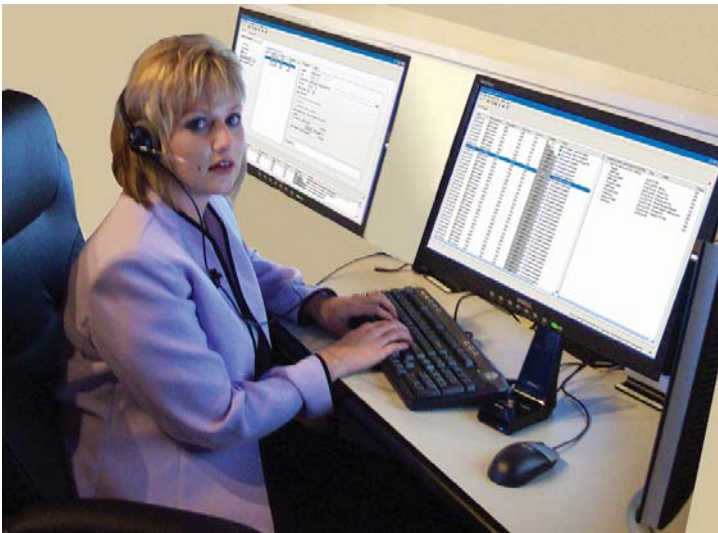
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Key Management Facility II

EFJohnson's Conventional IP25™ Infrastructure Systems combine the global reach of the VoIP infrastructure standard with the Project 25 Common Air Interface (CAI).

Maintaining security and control over the radios on your network is a vital function. Control every P25 radio on your network with EFJohnson's Key Management Facility II (KMF II). KMF II is a secure, fast P25-compliant client-server solution that simplifies secure key management and distribution.



Using Sophisticated Encryption Keys

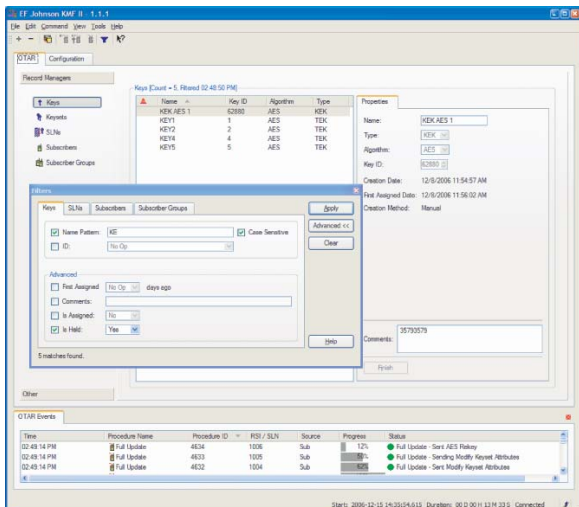
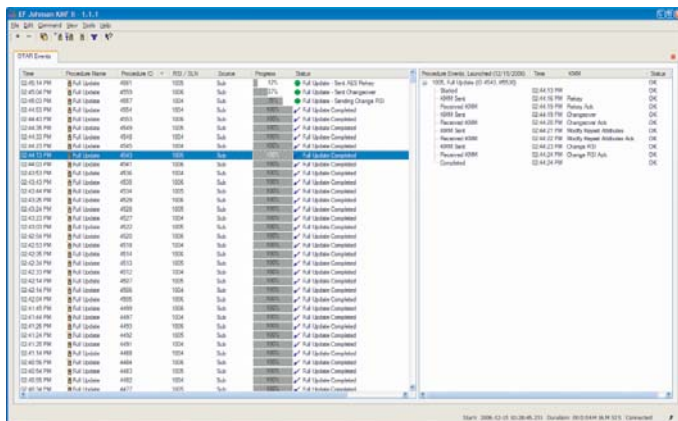
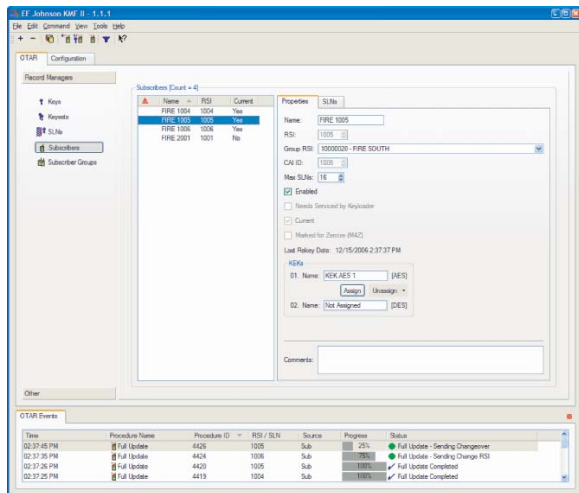
KMF II provides you with a reliable, flexible, and portable means to securely manage your communications. Centralizing your key management eliminates the need to manually rekey your radios. The rekeying feature in the KMF II, known as Over-the-Air-Rekeying (OTAR), encrypts and sends the keys and related key management messages to prevent them from being disclosed. For added security, KMF II enables you to send new keys to any radio on your system. You can create talk-groups to ensure that messages are communicated to the right people at the right time. If a radio is lost or falls into the wrong hands, KMF II allows you to disable it.

Key KMF II Functions:

- Creating and deleting keys
- Managing subscribers
- Managing subscriber groups
- Determining whether subscriber can be successfully addressed
- Updating subscribers with latest encryption-related material
- Removing all keys from a subscriber, should it become lost or compromised
- Display a searchable log of all OTAR-related system activity

Conventional IP25™ Infrastructure Systems

Key Management Facility II



Advantages

Open Architecture – manage the encryption keys of any P25 OTAR-compliant mobile or portable radio
Administration – query the radios to find out what keys are currently loaded, which helps in troubleshooting
Security – communicate between the KMF II server and client over a secure TCP/IP session
Flexibility – send new keys to all radios on your system, or set up secure groups to provide encryption to personnel responding to a specific incident or emergency
Organization – manage secure radio communications among talk-groups, enable operators to visually track members and encryption keys assigned to each group
Simplicity – set up KMF II in minutes with minimal training
Convenience – manage key encryption with a PDA-based key loader

System Components

- Application software
- Windows XP-based client workstation
- Linux-based hardware server
- Johnson Encryption Machine (JEM)

For more information, visit
www.EFJohnson.com
800-328-3911

*** Project 25** – Telecommunications Industry Association's (TIA) standard for digital 2-way radio technology. Originally created by the Association of Public Safety Communications Officials, International (APCO) in cooperation with the National Association of State Telecommunications Directors (NASTD) and the U.S. government to ensure interoperability between Federal, State, and local public safety agencies.

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IP25 Digital Dispatch Console

EFJohnson's Conventional IP25™ Infrastructure System provides the secure, reliable infrastructure for your communications needs—today and tomorrow. IP25 combines the global reach of the VoIP infrastructure standard with the Project 25 Common Air Interface (CAI).

IP25's Digital Dispatch Console operates on a Windows® XP computer—requiring less space than traditional desk-sized command consoles—and provides the interface into the IP25 packet network. Since it runs on a PC or laptop, you can take it anywhere. You can manage your entire network from one place— anywhere you have a computer.

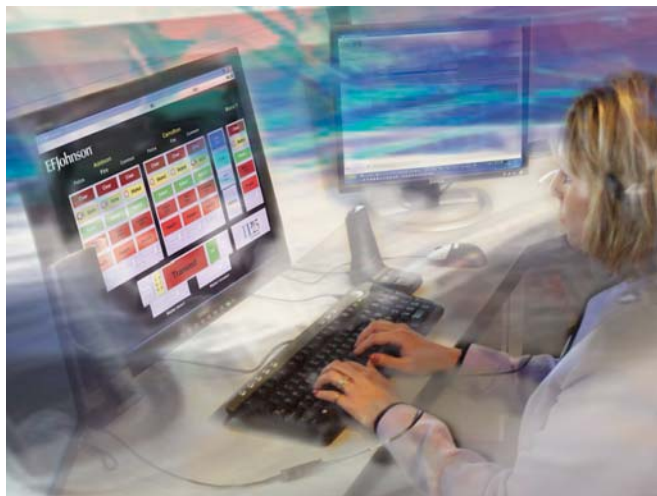


Point, Click, Control

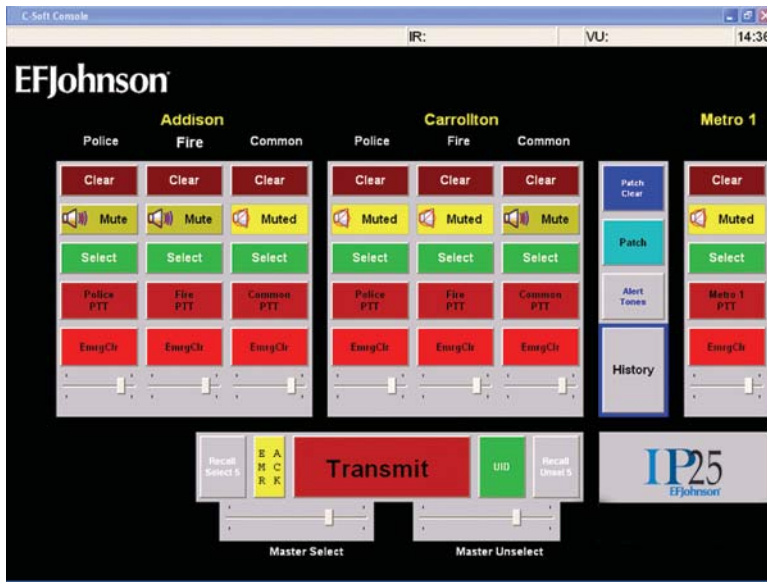
The IP25 Digital Dispatch Console is easy to configure. Customize your display features, capabilities and visual presentation with just a point and click. Develop multiple screens based on individual dispatchers' roles and responsibilities, user requirements or mission needs.

IP Radio Capability

Communicate with all of the P25 radios on your network with the IP25 Digital Dispatch Console's radio capability. Simply connect a microphone and speakers to the PC running the IP25 Digital Dispatch Console, and you can talk to your field radios from anywhere. In addition to being able to communicate with P25 conventional radios, you can communicate with existing non-P25 conventional and trunking protocols through the EFJohnson IP25 Gateway.



IP25 Digital Dispatch Console



Advantages

- Easy to set up and use so you can manage your network in no time
- Runs on a Windows XP-based computer
- Communicate with P25 radios on your network on an individual basis, or establish talk-groups
- Deploy more consoles in less space than ever before
- Eliminate the process of reprogramming a host computer to use a protocol compatible with the network

System Requirements

Windows XP operating system
Pentium® 2 processor or greater
10/100 BaseT Ethernet port
Sound Card
128 MB RAM
100 MB disk space

For more information, visit
www.EFJohnson.com
800-328-3911

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Conventional IP25™ Voter

Conventional IP25 Voter

EFJohnson's Conventional IP25™ Infrastructure System provides secure, reliable communications for First Responders. It combines Project 25 advanced private land mobile radio features and Common Air Interface with the Internet Protocol (IP), the global standard for packet data networks.

The Conventional IP25 Voter helps correct the imbalance caused by high-power transmit sites with a large talk out range, and low-powered mobile and portable radios with a relatively small talkback range. The IP25 Voter works with geographically dispersed receive sites to extend the talkback range of conventional mobiles and portables.



The Conventional IP25 Voter uses a modern, software based design that supports analog, P25 digital, clear or encrypted communication. This mixed mode voting comparator has multiple DSPs, utilizing multiple quality indicators to select the best signal for re-transmission and/or routing to a dispatch console.

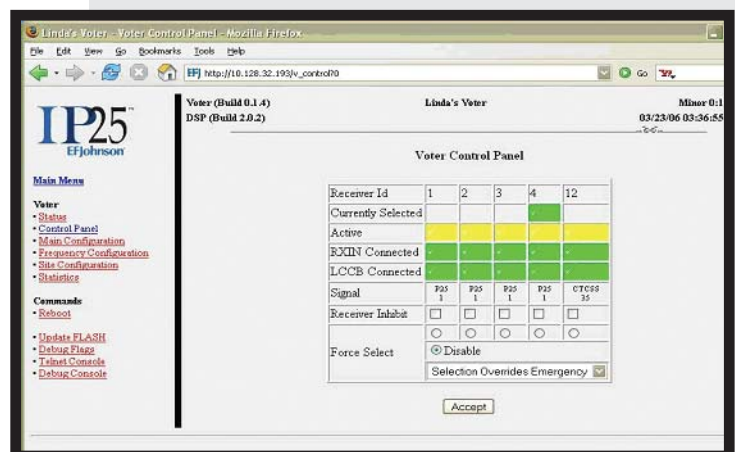
The IP25 Voter is ideal for small or large systems. A single IP25 Voter can support up to 16 receivers operating on the same frequency. Its inherent IP architecture enables low cost, single-site or wide area systems, and simple implementation of features such as multicast and transmitter steering.

Whether public safety or federal government, the IP25 Voter is the ideal choice for First Responders needing fast, reliable, high quality communication.



Advantages:

- Integrated solution for Conventional P25 digital and analog voting
- Supports clear and encrypted digital voice
- Modern software based design
- Sophisticated voting algorithms utilize up to 4 methods of comparison to ensure the best signal is selected
- Support up to 16 receivers with one IP25 Voter
- Browser-based Voting System Management
- Native IP-based architecture
- Streamlined 1 Rack Unit design



Conventional IP25™ Voter

Integrated Analog and Digital Voting

The IP25 Voter is a conventional voting comparator that supports both analog and P25 digital signal voting in a single rack unit device. It also supports clear and encrypted digital calls.

Sophisticated Algorithms Using Multiple Quality Methods

The IP25 Voter utilizes multiple DSPs and multiple methods of comparison to ensure the best signal is selected for communication. The type of call (analog or digital) and signal conditions (strong or weak) are used to determine the voting method or methods.

For analog calls, the voting algorithm will use a combination Out-of-Band Energy (OOBE), Received Signal Strength Indication (RSSI), and Signal-to-Noise Ratio (SNR), with OOBE providing the most valuable information in weak signal conditions and RSSI providing the most valuable information in strong signal conditions. For digital calls, quality selection is based on error counts, and in situations where multiple packets have no errors or the same number of errors, the Voter will use RSSI.

Call Priority and Arbitration

In situations where calls are received from multiple sources at the same time, the Voter will use priority and the configurable rules of Preemption and Ruthless Preemption to determine which call source should take over the channel. Emergency calls are automatically given the highest priority and will preempt any pre-existing non-emergency calls regardless of the configuration of the Preemption or Ruthless Preemption options.

Voting System Management

The Voting System Management application allows remote configuration, administration and maintenance of the Voting System. The System Management application can be accessed using a standard Internet browser. To ensure the operation of the IP25 Voter, the System Manager can be used for the following:

- Monitor voting system operations including which receivers are connected, active in a call and selected.

- Control the voting system including disabling or forcibly selecting a receiver
- View system alarms including a receiver or link failure, IP25 Voter DSP failure or socket failure.
- Generate hourly, daily, weekly or monthly statistical reports on voting activity.

Voice-over-IP Architecture

The IP25 Conventional System utilizes a Voice-over-IP (VoIP) architecture. Each element in the system, including the IP25 Voter, has an Ethernet port and software supporting standard Internet Protocol (IP) networking. This native IP architecture allows quick plug and play installation, feature rich, wide area routing and remote software upgrades.

No complicated wiring, crosspatch panels or Centralized Electronics Banks are needed. Multicast and transmitter steering are a snap with IP call routing. New software for the IP25 Voter can be easily sent using FTP.

Specifications:

Interface	Dual 10/100 Base T Ethernet
Max. Number of Receivers	Up to 16
Analog Voting Methods	Signal to noise ratio (SNR) Received Signal Strength Indication (RSSI) Out of band Noise (OOBN)
Digital Voting Methods	Bit Error Rate (BER) Received Signal Strength Indication (RSSI)
Voting Rate	Up to 50 votes per second
Receiver Protection Analog Digital	CTCSS, CDCSS NAC
Operating Temperature	-30 to +60
Humidity	5% to 95% Non-condensing
Power Requirements	12-24 VDC 110-240 VAC, 50-60 HZ
Power Consumption	12 Watts
Dimensions	1.75" H x 19" W x 12" D (1 RU)
Weight	10 lbs

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